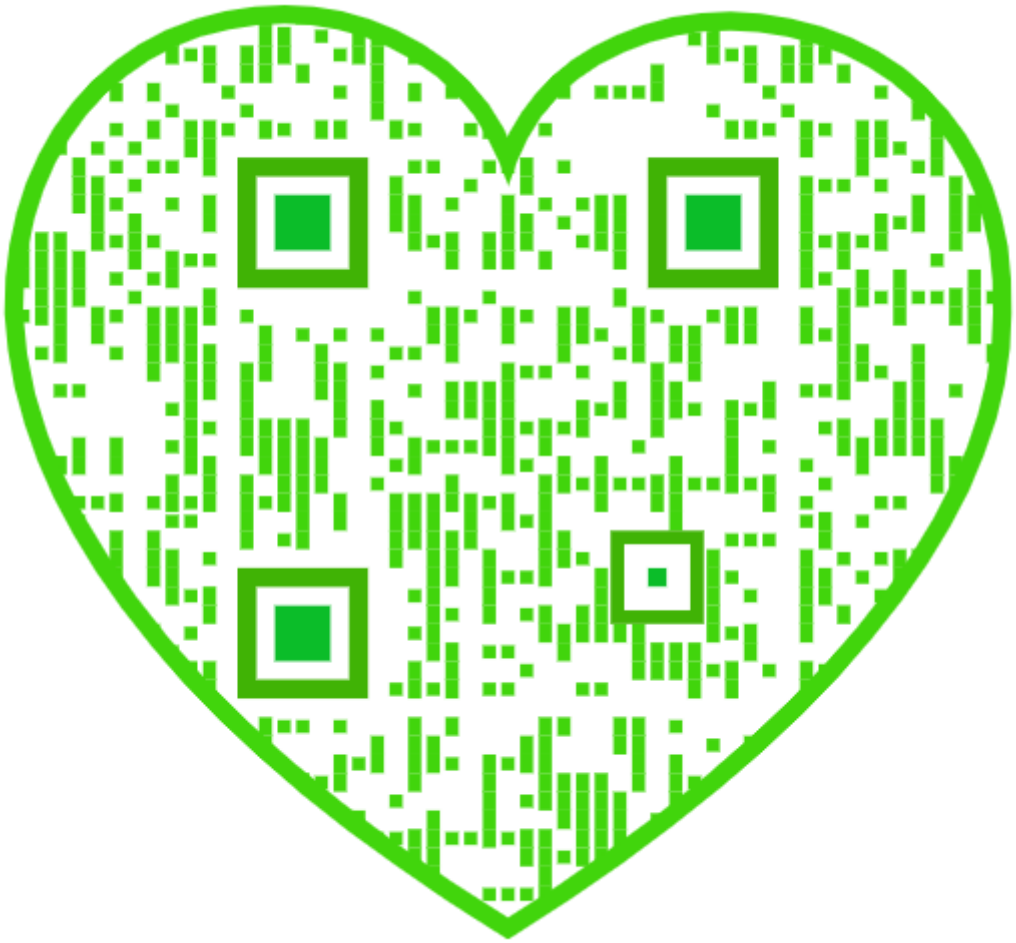

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THE

STOCK OWNER'S ADVISER

THE BREEDING, REARING, MANAGEMENT, DISEASES AND TREATMENT OF DOMESTIC ANIMALS

BY

C. K. RHODES, V. S.

ILLUSTRATED

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PREFACE.

The frequent inquiries from farmers and stock-raisers throughout the country, and their inability to procure professional aid, suggested to the author the need of a reliable work of this kind. In attempting to supply this want he has brought to the work the training and labor of years spent in practice, in the laboratory, the dissecting room, and hospital ward.

It is the aim of this volume to impart such information as will enable the non-professional reader not only to preserve the health of his stock, but also to know what remedies should be employed for their common ailments. It clearly explains how to breed according to physiological laws, how to rear animals under hygienic principles, and how to manage horses. An earnest effort has been made to present in the plainest possible way the nature, cause, symptoms, and treatment of each disease in the form in which it most frequently occurs. The various conditions requiring surgical interference and the surgical operations to be performed in such cases are briefly described, and wherever possible the reader is informed whether the indications for operation are favorable or otherwise, and whether the operation requires the service of a professional surgeon.

It is claimed that, so far as anatomical and physiological problems are concerned, this volume is rigidly scientific, embracing all modern discoveries, so far as they come within the scope of its plan and purpose. Its style, arrangement, and application are, however, addressed to the popular rather than the professional reader. Its object is to give popular instruction on those subjects which have hitherto been to most people a sealed book.

INTRODUCTORY.

All animals from early youth to old age are exposed to many dangerous and troublesome affections, the result of causes not less complex and multifarious than those influencing the human organization. Many diseases are the consequences of domesticity and of defects inherited from progenitors; others are dependent upon accidental circumstances, bad treatment, and improper nourishment. Not a few mortal maladies are the result of contagion, infection, and other like causes. While all domestic animals are more or less subject to certain diseases peculiar to their race, those breeds of most value to man are liable to a greater number of ills and casualties than others, for the reason that they are frequently exposed to extraordinary fatigue. Those diseases resulting from specific causes, either natural to the race or artificially produced by the animal itself in a state of morbid derangement, are most frequent and fatal. The close resemblance existing between the diseases of the lower animals and those of the human race, as also the strong similarity in the action of many drugs over the brute and human systems, render the study of one branch almost synonymous with that of the other. It has been strenuously objected that drugs do not act upon the lower animals in the same manner as upon man. Stated in its broad sense, this is not true. In the vast majority of cases the action of drugs upon man and upon the lower animals, though seemingly different, is in reality similar. The more knowledge we acquire the fewer exceptions remain unexplained, and the whole matter is in all probability subject to laws whose development will greatly aid in explanation of various obscure clinical phenomena.

In the large cities of our country and in England hospitals for the accommodation of invalid animals are conducted upon

scientific system not less regular than that of similar establishments devoted to the relief of suffering humanity. To these hospitals thousands of sick animals are annually sent and receive every attention. Medicines are administered with the utmost care, either as assuagers of temporary pain or as remedial agents in the cure of disease. Operations the most complex are performed with the greatest skill, and every attention is bestowed upon these invalids in their different wards.

While this is true of the cities, yet vast agricultural districts, the sources from which our best stock come, are not only remote from these institutions, but are unable to procure professional aid. It is to my customers throughout the rural districts of the Eastern States, who have solicited my professional services, that I dedicate this work. I have herein given the fruits of my experience in practice, which, while chiefly in the great stock-raising regions of Virginia and West Virginia, extends from the province of Ontario to the Carolinas of our great Southland.

It behooves every lover of animals, who cannot readily procure professional aid, to make himself familiar with the nature and treatment of the most prominent affections of these companions of our sports and servants of labor, and at the same time acquire a knowledge of the operations of certain medicines upon the system.

I have endeavored to express myself plainly on all topics, endeavoring to simplify the work and render it a practical guide to the stock owner. This volume presents many new suggestions in hygiene, the management of disease, and development and improvement of animals, and the conclusions represent the results of the latest investigations by the world's most distinguished savants.

The plan of this work is to attempt to sift the true from the false, to reconcile seeming differences, to point out what we know in the fewest possible words, and to lay a foundation from which investigators may start forward with some knowledge of what has already been achieved, without spending a great deal

of time in the wild hunt through the almost boundless ranges of continental literature.

The description of disease is largely illustrated from photographs of the author's patients, taken by himself to assure absolute accuracy. Many of the ailments of animals are forcibly expressed in peculiar attitudes. Such attitudes as are distinct symptoms of any disease are shown in photographic illustrations, which may serve as a test to prove the accuracy of a diagnosis.

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THE HORSE.

I.

HISTORY AND HABITS OF THE HORSE.

We learn from Bible history that Asia is the home of the horse, and that he was used in Egypt more than 1600 years before Christ. From the earliest ages these noble animals were captured and tamed by the Egyptians. Their large caravan trade with the interior of Africa formed the first channel for the distribution of the horse throughout the world. New races were produced by breeding and mixing the different races from time to time, until now the number of races is almost innumerable. The horse in a domestic state is found in almost every part of the globe. Of the six ascertained original species of horses, only one has yet been discovered on this continent in a perfectly wild state. This species, an inhabtiant of the mountains of South America, has cloven hoofs. The larger herds of the Pampas are of French and Spanish origin, and entirely of the Andalusian breed. They are descendants of domestic animals, and can scarcely be called wild in the proper acceptation of the term. The same may be said of the wild horses found on each side of the Don. They are an offspring of Russian horses employed by Asolph in the year 1697, when for want of forage they were turned loose. The beach horse is the Canadian pony breed, originally from the south of France, and is the same as the Indian pony. The wild horses of the plains are of the old Spanish stock and the pure Andalusian. The fine bloods of England and America are crosses of the Arabian and several others. The wild rovers on the plains of Texas and the West are descendants of these breeds.

South of the Ararat mountains, upon which the ark rested, lies a fertile country, where the horse in a perfectly wild state is found in herds, some of which are said to consist of ten thou-

sand. Some of these horses in size, form, and motion are of the most perfect symmetry and models of beauty, possessing in a marked degree the varied movements and grace characterizing the carefully trained and bred horse.

The horse is the associate of man's pride, vices, and infirmities, no less than of his independence and strength. He, like man, requires, and is capable of, great cultivation and discipline. Associated with man in his sins, he has been cursed like him with his diseases.

The earliest history of the horse in battle is found in Pharaoh's pursuit of the children of Israel. His martial traits especially have been the theme of glorious description and eulogy in all ages. The muse of history has painted his superb appearance in battle and thrown a bewildering fascination around the brilliant charge.

HABITS OF THE HORSE.

The habits of the horse in all countries, and of all varieties, are much the same. Wherever he is at large he is bold, but shy, and readily taking note of the appearance of man. In their wild state the different herds do not mingle together, and if one strays from his own and gets into another herd he is kicked out. In his state of wildness he is most free and happy, and lives the longest. The wild rover of the plains lives to a great age, and, except in cases of accident or the fly, most of them die from old age. Some of them attain the age of forty and fifty years. They take exercise as nature requires, and are governed by its instincts. Their food is the wild grasses of the prairies, and their drink is of the clear water brook. Instead of the filthy stable of the domesticated animal, his bed is on the fresh grass of the valleys or elevated slopes. His shelter is under the deep shades of the olive and fig trees. Instead of the reeking fumes of crowded stables, the air he breathes is scented with the perfume of roses and flowers. His bed, therefore, in his wild state is one of blossoms and perfume. He visits the salt lakes, with which the country abounds, and his simple life is almost free from diseases.

The horse naturally is subject to but few hereditary disorders, or perhaps to none, but indiscriminate commingling of blood has fearfully multiplied his diseases and occasioned deplorable degeneracy. Improper treatment and abuse at the hands of man have been the cause of nearly all his diseases and of his great loss in longevity and natural capabilities.

It is not our design to enlarge on these topics, but in their appropriate chapters they will be fully presented. It is with the horse as we find him in America that we have to deal in this work—the history of his diseases, their causes and cures, and rational and generous rules for his treatment and general improvement.

II.

BREEDING.

The art of raising domestic animals has attained a great degree of perfection, due to the recognition of certain principles in physiology. This subject has been studied as a science and practiced as an art for centuries, but there yet remains room for improvement. It will not be expected that the author will dwell minutely or at length upon the formation and growth of the fetal structures and trace them separately from their origin to their completion at the birth of the fetal animal.

Menstruation, or period of puberty, in the mare and cow is reckoned at the age of one to two years, in most cases; but the filly should not be bred until she is three or four years of age, and even older, if she is immature. The cow may be bred at two years of age, or earlier, if well matured. There is, with few exceptions, a periodical discharge of mucus from the vagina. This discharge naturally follows the ripening and liberation of an ovum, and continues in a great majority of cases from two to four days; it recurs once in four or five weeks, and continues as long as the female is capable of conceiving, or rather as long as ova are developed. Menstruation is ovulation. When the genital organs are sufficiently developed, a germ cell, or ovum, is evolved from its ovarian bed, and passes along the channel of the fallopian tube into the uterine cavity; unless impregnated in its course by meeting and mingling with the sperm cell of the male, and fixed upon the wall of the utero-fallopian canal, it is expelled through the vaginal passage, a process repeated every four or five weeks in the mare and cow. At this time the nervous system of females is sensitive, and it is the only time that copulation is indulged in. Immediately before and after this period, conception is more likely to take place. The contests between

the males of animals during the period of Oestrum are interesting. The animal wins the female through the law of battle. The most timid animals, not provided with any special weapons for fighting, engage in desperate conflicts during this season.

In Colorado the law requires every person having cows running at large to turn with them one bull for every twenty-five cows. These bulls, when strange ones meet, fight with great ferocity. They are more likely to meet when the cows are in heat.

A stallion will drive all other stallions and geldings out of his band, and sometimes even strange mares, especially if his band is large and he is well acquainted with them. If he desires to increase his band he will steal any mare he can find. He either leads or drives them to and from water, and as they are strung out he will pass back and forth with his head near the ground; if one is missing he will leave the band and search diligently until he brings her in, using teeth or heels for a whip. It is both difficult and dangerous to lead a mare from a band having a regular herder, as the stallion is called.

Where mares are kept in bands herded by stallions, it often happens that horses try singly to whip out a horse of another herd, and if they fail, get another to join the contest. One will engage with the horse while the other drives away the mares.

Where a stallion is allowed to run as a herder of a small band of mares, we may expect the most perfect progeny. Here he escapes the injury of confinement in close, dark, and badly-ventilated stables. Stable feed has a tendency to heat the blood, a condition that often affects the genital organs. Constant confinement renders his disposition fierce and intractable, and privation of the daily society of the mare makes the matter still worse. When he is led out to meet her he is all frenzy and fever, and can hardly be controlled. This disposition will most assuredly be imparted to the foal. Almost invariably the foal will partake chiefly of the constitution and disposition of the sire, while his form and size are mainly derived from the dam. The

operation of this law indicates the necessity of proper treatment. If the male were allowed constant association with the other sex he would be quiet and manageable. The horse and mare should be allowed to run together during the period of ovulation. This can be done by selecting a field, or by making a large enclosure in some out of the way place. This arrangement would do away with attendants' fees and would be the cheaper plan. By far too few horses are kept as breeders, and they are taxed beyond all reason and decency. Among the intelligent breeders of Kentucky it is not uncommon for a gentleman to keep a horse of his own to serve his own mares, and perhaps a few others. Sometimes a few farmers club together and purchase a first-class horse. This is a move in the right direction, and it is to be hoped that others will follow their example.

No horse should serve more than twenty-five mares during the breeding season, and never oftener than every other day. The progeny of a horse allowed to serve sixty or seventy mares during the season cannot be sound; and if a foal is produced at all it will be big-boned, loose-jointed; of flabby, uncompact muscle, and with feeble constitution. A foal gotten under such circumstances cannot be expected to prove otherwise than weak and feeble. A great number of such die before they attain the age of one year. The intelligent breeder will not have his animals begotten, born, and bred under such unphysiological conditions. The laws of life and health, and the rules of normal development, are the same in all living organisms. If we have unsound germs we cannot expect a sound progeny, and where a horse is allowed to serve one or two mares a day the germ is immature. How frequently we see a handsome mare served by a fine horse and the progeny falling far below the standard of their excellency. It is established that conception is the mingling of certain elements to which both animals contribute. It is probable that the seminal fluid of the horse forms the first substance of the fetus, while a small particle of blood with the ovum of the

mare communicates the principal of life. This is considered to be the case in all red-blooded animals.

SIGNS OF PREGNANCY.

The first well-marked sign is suppression of menstruation, or period of heat. As a rule, when the mare conceives the desire for the male is no longer observable; and on being led to the horse she not only refuses to receive his caresses, but assumes the offensive, viciously striking and biting at him until led away. In the first stages of pregnancy the coat becomes sleeker and the mare becomes quieter in disposition. This disposition changes near the end to a crabbed one. Enlargement of the mammary glands is a more uniform and reliable symptom. The mamma, soon after conception, becomes more hard and movable, while the teat is more prominent and frequently painful or tender, and the veins of the glands enlarge. These changes may occur in two or three weeks, or not until two or three months after conception. Enlargement of the abdomen is apparent in the third month of pregnancy, but a similar appearance may result from dropsy or from a tumor. The abdomen gradually enlarges as pregnancy advances, the right side being a little larger than the left. This enlargement is especially well marked in the cow. In some cases the beating of the fetal heart may be heard with the assistance of the stethoscope. After the eighth month well-marked symptoms of pregnancy are manifest, the abdomen at this time being considerably distended, the back sinking, etc. To be certain of pregnancy when there are no well-marked signs, such as enlargement of the udder, secretion of milk, enlarged vulva, etc., we must examine per rectum. It is also recommended by some practitioners to make an examination through the vagina, but such a procedure is objectionable.

DURATION OF PREGNANCY.

The period of utero-gestation in the mare is forty-eight weeks; in the cow, forty; in the sheep, twenty-one or twenty-two; in

the sow, sixteen or seventeen; in the bitch, nine; and in the rabbit, about four weeks; in the cat, eight weeks. The period of gestation may vary to a remarkable extent in mares and cows. This difference is owing to some extent to the difficulty of fixing the exact time of conception. Male foals are carried two or three days longer than female foals, and, as a rule, an old mare carries her foal longer than a young mare.

EMBRYOLOGY.

The primary changes undergone by the fecundated ovum, interesting as they are, can be merely alluded to here. By repeated fusion of the vitelline substance there arises a cellular material called the embryogenic tissue, or blastoderm, out of which the body of the embryo is formed. This tissue divides into three layers—an outer, a middle, and an internal—called, respectively, the epiblast, mesoblast, and hypoblast. From the epiblast becomes developed the epidermis and its appendages and the cerebro-spinal axis; from the hypoblast the mucous membrane of the alimentary canal, while the mesoblast forms the intervening organs and tissues. A linear indentation, the primitive groove, appears on the epiblast; below and coincident with this the notochord is formed, indicating the position of the vertebral column.

The chief appendages and coverings associated with fetal life are the umbilical sack, the amnion, chorion, and allantois, the placenta, and the umbilical cord. The outer covering of the fetus is the chorion, a membrane derived from the blastoderm and reflected over the fetus. The placenta is formed by the connection of this covering with the mucous membrane of the uterus. The inner covering is the amnion, which contains a fluid, the liquor amnii. The allantois or urinary vesicle is regarded as taking its origin from the primitive intestine. Becoming vesicular in form, to it proceeds the ducts of the Wolffian bodies, or primordial kidneys. The umbilical sack proceeds from the blastoderm. It covers the yelk, and like the allantois

is not included in the amnion. The placenta, or after-birth, is a soft, flat, spongy, highly vascular body. It assumes a variety of forms in the various classes of animals. In the mare and sow it is diffused—*i. e.*, it consists of villi scattered over nearly the whole of the outer surface of the chorion, and received into crypts or corresponding recesses in the uterine mucous membrane. In the ruminant the placental villi are collected into groups, forming a number of rounded or ovoid objects, termed cotyledons. It is the medium of communication between the mother and foal, its office being to supply necessary nutrient to the fetus. In carnivora the villi are collected in a mass, which assumes the form of a belt, surrounding the chorion, and hence called a zonary placenta. In rodentia the placenta is discoid, the villi being assembled in a more or less circular mass.

THE UMBILICAL CORD.

The umbilical cord is the channel of communication between the fetus and the placenta. It is composed of two arteries and one vein.

DEVELOPMENT OF THE FETUS.

The horse's embryo at six weeks has a length of 1 3-5 inches; at seven weeks, 2 inches, and at eight weeks, 2 3-5 inches; the thoracic and abdominal cavities are closed. At the ninth week the embryo measures 3 1-5 inches; the external ears are very small; the Wolffian body, genital glands, and suprarenal capsules are present. At ten weeks the embryo measures 3 4-5 inches; the internal and external genital organs are formed. At eleven weeks the embryo measures 4 1-5 inches, and at twelve weeks 5 3-5 inches. At seventeen weeks it measures 14 3-5 inches. At seventeen weeks the first hair appears on the lips. At twenty-two weeks the lips, eyelids, and point of the tail are provided with hair. The length of the embryo at the twenty-third to twenty-fourth week is about 27 inches. The hair appears on the crest and back. The testicles lie near the abdominal

ring. At the twenty-fifth to forty-eighth week the fetus measures 3 feet; it is completely covered with hair, and the testicles pass into the scrotum. The vaginal ring is very wide, and slight hernia is generally present.

The embryo of the ox at twenty-eight days has a length of 2-3 inch, and corresponds in its development to the sheep embryo of twenty-five days. At six weeks the embryo is 4-5 inch in length, and corresponds to the twenty-two-twenty-three days old dog's embryo. At seven weeks it is about 1 1-5 inches in length; the udder begins to form; the kidneys and ureters are present. At eight weeks the embryo is from two inches to 2 3-5 inches. At eleven weeks, 4 2-5 inches, and its development corresponds to that of the horse's embryo of the same age; mouth-groove and nostrils are closed by a thin membrane; the divisions of the stomach are present. At twelve weeks the embryo measures 5 3-5 inches. From the fourteenth to the twenty-second week the embryo increases from 5 3-5 inches to 12 3-5. At eighteen weeks the hair appears and the testicles descend into the scrotum. The embryo at the end of thirty-two weeks measures about 25 inches. From the thirty-third to the fortieth week the fetus measures about 32 inches.

The embryo of the sheep at eighteen days has a length of 1-3 inch. At thirty-two days indications of the feet appear. At twenty-five days it has a length of 2-3 inch; indications of the eyes, ears, and tail are present; the intestine exists as if connected with the umbilical vesicle; the Wolffian body is well developed. At the fifth week the embryo has a length of 1 inch, and in development corresponds to the twenty-five days old dog's embryo. At nine weeks 3 3-5 inches; the nostrils are still closed. At the tenth to eleventh week the embryo of the sheep and goat measures 6 2-5 inches; hair is still wanting. From the thirteenth to the eighteenth week it measures from 10 to 13 inches. At the twenty-first to twenty-second week the fetus has a length of about 18 inches; goat, 13 or 18.

The pig's embryo at twenty-one days has a length of about 1-3

inch; at twenty-four days, 1-2 to 3-5 inch. The umbilical vesicle has reached its maximum size. At twenty-eight days the embryo has a length of 1 inch; at thirty-seven days, 2 1-5 inches. Length of embryo in the eighth week is 3 1-5 inches. At the ninth and tenth month it measures 5 1-5 inches. At the fifteenth it measures about 7 inches in length. At the sixteenth or seventeenth week the fetus has a length of 10 inches.

Carnivora.—The dog's embryo measures about one line in length at the second week. The chorion and amnion can be made out. At the third week the villi appears on the chorion, and becomes attached to the mucous membrane of the uterus. At eighteen days the embryo of the dog has a length of about 1-5 inch; the primitive groove and chorda dorsalis are present. At nineteen or twenty days the heart is present as an S-shaped tube; the intestine begins to form. At twenty-one days indications of the eyes, ears, and Wolffian body are present; the limbs are present as small blunt processes. At twenty-two to twenty-three days the embryo has a length of about 3-5 inch; mouth groove, nostrils, lungs, trachea, and larynx are present; the anus is still closed; Wolffian body well formed; limbs about one line in length. At twenty-five days the thorax is closed, and the abdominal cavity almost closed. At twenty-six to twenty-eight days the embryo is about 1 3-5 inches in length; all organs are more or less distinctly marked. Length of embryo in the fifth week is 2 3-5 inches; at six weeks, 3 1-5 inches. At eight weeks the dog's embryo measures 5 inches; the cat's embryo, 4 inches. The body is covered with hair, and the claws are present. The eyelids are closed, and the testicles are still in the abdomen. At nine weeks the dog's fetus measures about 7 inches; the cat's fetus about 5 inches.

PARTURITION.

When the fetus is expelled from its uterine cavity, before the period of viability, the process is termed abortion or miscarriage. When the expulsion occurs during seventh or eighth month it is termed premature labor. Why the uterus expels its contents

at or near the end of eleven calendar months in the mare, and at the end of nine and a half in the cow, is not easy to explain. That the uterus loses its anatomical connection with the fully developed and independent fetus is simply a fulfillment of the laws of reproduction. So true, so admirable, and energetic are the manifestations of the vital instincts of the uterus on this occasion that they seem almost like intelligence. Dunglison says: "With respect to the causes that give rise to the extrusion we are in utter darkness. It is in truth as inexplicable as any of the other instinctive operations of the living machine. Our knowledge appears to be limited to the fact that when the fetus has undergone a certain degree of development, and the uterus a corresponding distention and organic changes, its contractility is called into action, and the uterine contents are beautifully and systematically expelled."

CAN SEX BE PRODUCED AT WILL?

To be able to determine the sex of embryo in animals would greatly advance the art of breeding. From the observation of During on this subject, I think we may safely conclude that among animals and plants, as well as in mankind, a favorable environment causes an excess of female births and an unfavorable environment an excess of male births. As the result of nearly a million observations of the births of colts, he shows that, as the number of mares put to a stallion in a year is increased, there is a corresponding and regular increase in the number of male colts as compared with the female colts. He states that, while domesticated animals are much more prolific than their wild allies, there is also a much greater preponderance of female births; that when animals are taken from a warm to a cold climate the ratio of male births increases, and that leather dealers say that they obtain most female skins from fertile countries where pastures are rich, and most male skins from more barren regions; and he thinks we may safely conclude that the lower animals, as well as man, give birth to the greatest number

of females when placed in a favorable environment, and to most males in an unfavorable environment. Dr. Manly Miles, in his most excellent work, entitled "Stock Breeding," has collected a number of facts bearing on the theory that if the male is older and stronger than the female the offspring will be more males than females. If the females are most vigorous the offspring will contain more females.

At a meeting of the Agricultural Society of Severac, on the 3d of July, 1826, M. Charles Gironde Buzareingues proposed to divide a flock of sheep into two equal parts, so that a greater number of males or females, at the choice of the proprietors, should be produced from each of them. Two of the number of the society offered their flocks to become the subjects of his experiments, the results of which are given in the following table. The principle of division was to place young rams with strong, well-fed ewes for ewe lambs, and a matured, vigorous ram with weaker ewes for ram lambs.

The first experiment gave the following results:

FLOCK FOR FEMALE LAMBS SERVED BY TWO RAMS, ONE FIFTEEN MONTHS AND THE OTHER NEARLY TWO YEARS OLD.			FLOCK FOR MALE LAMBS SERVED BY TWO STRONG RAMS, ONE FOUR AND THE OTHER FIVE YEARS OLD.		
Age of Mothers.	Sex of Lambs.		Age of Mothers.	Sex of Lambs.	
	Male.	Female.		Male.	Female.
Two years	14	26	Two years	7	8
Three years	16	29	Three years	15	14
Four years	5	21	Four years	33	14
Total	35	76	Total	55	31
Five years and over	18	8	Five years and over	25	24
Total	53	84	Total	80	55
There were three twin births in this flock.			No twin births in this flock.		

In the second experiment the ewes were divided into three sections. The first section included the strongest ewes from four to five years old, which were better fed than the others. It was

served by four ram lambs, about six months old. In the second section were the weaker ewes, under four or above five years old. They were served by two strong rams more than three years old.

The third section consisted of ewes belonging to the shepherds, which are in general stronger and better fed than those of the master, because their owners are not always particular in preventing them from trespassing on the cultivated lands that are not inclosed. These ewes were served by the same rams as section two:

	Males.	Females.
The first section gave.....	15	25
The second section gave.....	26	14
The third section gave	10	12

In the first section were two twin births—four females. In the second and third there were also two—three males and one female.

These experiments were considered almost conclusive; but it will be observed that the results are not more remarkable for the range of variations presented in the relative numbers of each sex than were obtained in my experience in different years with animals under the same management.

After weighing the whole evidence I come to the conclusion that where the male is better developed and older than the female we may expect an excess of males, and where the female is better developed an excess of females. If the female germ has the greater vitality, is more richly endowed with protoplasm, then the ovum will develop after the female form. How shall we apply these theories in breeding animals? If we make the environment of the female unfavorable and that of the male favorable, we may do her and the offspring harm, and vice versa. We have but one resource left, and that is, as far as we can, to control the time of impregnation. The weight of testimony collected from experiments on this point goes to show that an early impregnation favors the development of females, and a late impregnation the development of males. Starting from this idea

and supposing that the complete maturity of an ovum might be very favorable to the production of male sex and inversely, M. Thurg caused cows to be impregnated sometimes at the beginning, sometimes at the end, of the rutting period. In the first case he obtained female calves; in the second, male calves. The experiment was repeated by a Swiss agriculturist, Mr. Cornaz, who twenty-nine times in twenty-nine cases succeeded in producing either sex at will. Giron found that if the female flowers of dioecious plants be fertilized as soon as they are fit to receive the pollen, the seed resulting produce mainly female plants, and that if the fertilization be deferred to as late period as possible the seeds resulting produce mainly male plants.

EFFECTS OF PREVIOUS IMPREGNATION ON THE FEMALES.

One of the great mysteries of generation is the effect of one impregnation of the female on the offspring by succeeding males. A few facts will make the matter clear. Dr. Trall, on the authority of Mr. George T. Allman, of Tennessee, gives the following case: "A bay mare, with black points, was bred to Watson, a son of Lexington, who is a golden chestnut, having a large star and both hind and near front ankles white. After dropping her foal he bred the same mare to his saddle stallion, Prince Pulaski, a very dark chestnut, with no white save a very small star: this produce was a facsimile of Watson in every particular."

A very fine Clydesdale mare was served by a Spanish ass and produced a mule. She afterward had a colt by a horse which bore a very marked likeness to a mule; seen at a distance, every one set it down as a mule. The ears were 9½ inches long, the girth not quite six feet, and he stood above sixteen hands high. The hoofs were so long and narrow that there was difficulty in shoeing them, and the tail was thin and scanty. He was a beast of indomitable energy and durability, and was highly prized by his owner. Dr. Miles writes that a mare belonging to Dr. H. B. Shank, of Lansing, Michigan, produced a mule, was afterward bred to a Morgan stallion with remarkably fine ears; the ears of

the colt were large and coarse, presenting a close resemblance to those of a mule. A second colt produced by the mare to the same stallion had the head and ears of its sire. Dr. Burgess relates a similar case: "From a mare which had once been served by a jack I have seen a colt so long-eared, sharp-backed, and rat-tailed that I stopped a second time to see if he were not a mule."

A pure Aberdeenshire heifer was served by a pure Teeswater bull, by which she had a first cross calf. The following season the same cow was served with a pure Aberdeenshire bull; the produce was a cross calf, which, when two years old, had very long horns, the parents being both polled. A small flock of ewes belonging to Dr. Wells were served by a ram procured for the purpose; the ewes were all white and woolly, the ram being quite different, of a chocolate color and hairy like a goat. The progeny were, of course, crosses, but bore a strong resemblance to the male parent. The next season Dr. Wells obtained a ram of precisely the same breed as the ewes, but the progeny showed distinct marks of resemblance to the former ram in color and covering.

Dr. Miles writes of visiting the farmer, Mr. A. N. Gillette, in the town of Delta, Ingham county, where he saw a litter of pigs out of a pure Berkshire sow, and got by a pure Berkshire boar. More than one-half of the pigs were apparently Poland China in the form of the head, and their bodies were spotted with sandy white. He was informed by Mr. Gillette that the preceding year the dam of these pigs had produced a litter of pigs by a Poland China boar, that were marked in the same manner with sandy white spots. The sow was bred under my direction at the Michigan Agricultural College three years ago, and the stock from which she had been descended had not shown any variations from the pure Berkshire type. Mr. Darwin gives the following case: "Mr. Giles put a sow of Lord Western's black-and-tan Essex breed to a wild boar of a deep chestnut color, and the pigs partook in appearance of both boar and sow, but in some

the chestnut color of the boar strongly prevailed. After this boar had long been dead, the sow was put to a boar of her own black and white breed, a kind which is well known to breed very true and never to show any chestnut color, yet from this union the sow produced some young pigs which were plainly marked with the same chestnut tint as in the first litter." A black, hairless Barbary bitch was first impregnated by a mongrel spaniel with long, brown hair, and produced five puppies, three of which were hairless and two covered with short, brown hair. The next time she was put to a full black, hairless Barbary dog; but the mischief had been implanted in the mother, and again about half the litter looked like pure Barbarys and the other half like the short-haired progeny of the first father.

Professor Agassiz states that he experimented with a Newfoundland bitch by coupling her with a water dog, and the progeny were partly water dog, partly Newfoundland, and the remainder a mixture of both. Future connections of the same bitch with a greyhound produced a similar litter, with hardly a trace of the greyhound. He had bred rabbits with the laws established by this experiment, and at last had so impregnated a white rabbit with a gray rabbit that connection of this white rabbit with a black male invariably produced gray. The same influence is observed in chickens, and I might cite numbers of incidents of this wonderful phenomenon of generation, but these facts will suffice. These facts show that the act of fecundation is not an act which is limited in its effects, but that it is an act which affects the whole system, the sexual system especially, and in the sexual system the ovary to be impregnated hereafter is so modified by the first act that later impregnations do not efface that first impression. Dr. Manly Miles, in "Principles of Stock Breeding," says: "It was formerly claimed that the peculiar influence of the male was limited to the first impregnation of the female only, but there is good reason to believe that every impregnation may leave its impression upon partly developed germs, and be thus transmitted with the characters of a subse-

quent fecundation." Darwin, in the vegetable kingdom, shows the "direct action of the male element on the mother form," and comes to the conclusion that the male element not only affects, in accordance with its proper function, the germ, but the surrounding tissues of the mother plant.

HORSES AND THEIR QUALITIES.

First of all, the sire should have a sound organization, free from hereditary ailment. There is no better established fact than that all progeny, vegetable or animal, takes its physical, mental and moral qualities from those which predominate in the sire and dam during the period of conception and gestation. The form, temper, disposition, and constitution are stamped at these periods on the offspring. It is well known that all the secretions partake of both the general and particular states of body and mind. It is by closely observing this law of animated nature that we preserve the health and improve the breed of animals. Those who wish beautiful and sound animals will see to it that the sire and dam are in their best bodily condition when procreating. A perfectly symmetrical body implies an equal and balanced contribution from every organ and structure, and to secure this result the animal should be free from all local congestions or irritations. The stomach should not be loaded, the liver should not be obstructed, the lungs should not be congested, and the skin should not be clogged. In short, there should be the normal play of all the functions. The wild horses of the plains do not suffer with hereditary diseases. None of them are malformed, and no epidemic, not even endemic disease, prevails, showing that they die the natural death of healthy and sound animals. Could we learn the cause of this exemption, nothing in the history of the horse could be of more interest or benefit. A horse's limbs should not be too long, but trim and clean, and his joints round and well set. He should have considerable space between the eyes, nose not dished, and the Roman nose is not desirable. Mouth of medium size, but not too shallow. The side

of the face should have well-developed maseter muscles, otherwise he cannot masticate his food properly. The eye is the index of the horse's character. The study of the disposition of the horse is one which the veterinary surgeon soon masters. He can tell at a glance if it is necessary to throw the horse for operation. The eye should be large, clear, and of a variegated, cinnamon color, for this sign of a good eye adds to the beauty of the horse. It should not be sunk within its orbit, and the lids should not be wrinkled. The ears should be small and well tapered. If thrown back and forth during progression it indicates an excitable horse. The inferior maxillary or lower jaw should be wide; if narrow, it shows a predisposition to disease. The neck of the draught horse should be short. Roadsters and saddle horses should have long, rangy necks, wiry to the feeling, and should leave off in front of withers. Withers should be high for speed. The back should be straight, or nearly so, and of proper length. The ribs should be large, the flank smooth and full, and the hind parts or uppermost haunches not higher than the shoulders. There should be a good space between the back and the angle of the rib. The loins should be broad, the croup a little below the level. The tail should be carried well up heavy, and a firm dock. The chest is of great importance. A horse for speed should have a narrow bosom with an increasing curvature from before back. The last rib should be in close proximity to the angle of the ilium. He should be deep in the girth and round-bodied. The scapula, or shoulder blade, for speed should be oblique, while that for draught should be more upright. The arm for speed should be 22 inches long, well muscled. The knee should be broad from side to side and nearly flat before, and allow the heel of the foot to touch the elbow when flexed. The limb should be flat below the knee and no thicker than a man's hand for roadsters or horses for speed. For gracefulness and ease of gait the horse should have an oblique pastern. Draught horse should have an upright or straight pastern. The foot should be smooth and tough, of a middle size, without wrinkles,

and neither too hard and brittle nor too soft; the heels should be firm, and not spongy and rotten; the frogs horny and dry, and the sole a little hollow. The foot should not be flat or thin in the wall. Such feet will never disappoint your expectations, and such only should be chosen. The haunches should be well developed and not higher than the shoulders. The thigh should be well muscled, and the hind-quarter should not be too short. The hock should not be tied in below nor sickle shaped; the oscalces should be of medium size.

The wind of the horse should not be overlooked, and may be easily judged by noticing the flanks and by putting him to exertion. The temper of the horse should be particularly attended to. Avoid a fearful horse, which you may know at first sight by his starting, crouching, or creeping if you approach him. A hot and fretful horse is also to be avoided, but be careful to distinguish between a hot, fretful horse and one that is eager and craving. The former begins to fret the moment he is out of the stable, and continues in that humor till he has quite fatigued himself; but the latter only endeavors to be foremost in the field, and is truly valuable; he has those qualities that resemble prudence and courage; the other those of intemperate heat and rashness. His head should not be heavy, nor his neck thick and gross. A horse that goes with his heels very wide seldom moves well, and one that has them too near will chafe and cut his legs by crossing them. Fleshy legged horses are generally subject to Grease and other infirmities of that kind, and therefore should not be chosen.

A horse that goes with his forefeet low is apt to stumble. Some go so near the ground that they stumble on even roads, and must be shod with heavy shoes. Care should be taken that the horse does not cut one leg with the other. A horse that goes near the ground will cut the low side of the fetlock joint, but one that goes high cuts below the knee, which is called the speedy cut. A horse that lifts his feet high generally trots fast, but is not the easiest for his rider, nor for his own feet on hard

pavements. Some horses cut with the spurn of the foot and some with the heel, but this may be perceived by their standing, for if a horse points the front of his foot inward he cuts with the spurn, and if outward with the heel.

For the average farm horse of this country about sixteen hands is the most desirable height. A horse with full form and well-developed muscles is preferable below rather than above sixteen hands high. The weight should be from thirteen to fifteen hundred pounds. Such is the most desirable horse in our cities for all delivery and dray purposes. The saddle and carriage horse should be of the same mold—light and free of limb, with a height of not more than fifteen hands and a half. A horse for rapid motion should possess parts very different from the farm horse. If the colt is designed for a saddle or carriage horse the mare should be bred to a stallion of superior adaptation for one or the other purpose. If for great speed the mare should go well herself, and have good connections on her side, and should be bred to a stallion that in connection with his family has been noted for speed.

In measuring a horse the height is taken at the highest bony point of the withers, the spinous process of the seventh dorsal vertebra. Care should be taken to see that the horse, when measured, is standing on an exact level with the examiner and with the instrument used. The ordinary form of instrument used is the standard, a rod six feet in height, with a movable cross bar, the latter usually fitted with a spirit level. Care should be taken to see that the upright is perfectly vertical, as a small inclination will make an important difference in the horizontal bar. When there is a decided difference in the height of the withers and croup, as sometimes occurs, it should be noted, but the record is taken from the former. It must be remembered that in double teams the form and style in carrying the head will frequently render horses a good match, when the standard shows a decided difference in their height.

The horse varies in height from 9 to 22 hands; under 14

hands he is known as a pony; Cobs measure from 14 to 15½. Some of the great Belgian and English draught horses reach 18 hands. I once saw a coach bred gelding that measured 22 hands.

The average weight of an ordinary horse is about 1,000 pounds.

Ponies are under	800 pounds.
Light roadsters	950 pounds.
Ordinary roadsters and saddle horses	930 to 1,150 pounds.
Coach horses	1,000 to 1,350 pounds.
Light draught	1,000 to 1,350 pounds.
Medium draught horses	1,350 to 1,500 pounds.
Heavy draught horses	1,500 and over.

The color of the hair is an indication of some importance. The dark bay is the best color for strength and endurance. The iron gray and black next. For beauty the sorrel or chestnut proper exceeds them all. It is a rich, uniform, brownish red, like that of a ripe chestnut.

Except in the way of general directions, not much can be said in regard to the selection of a particular horse from which to breed.

III.

THE MARE---HER QUALITIES AND TREATMENT.

For breeding purposes the mare should possess a sound body. The nutriment of the fetus being derived directly from the mother's blood, if she is disordered or defective, its vital functions must suffer also. After conception the sire's condition or habits can have no further influence on the offspring during its embryonic life. The mother, however, must affect its character and destiny through all of her varying conditions during the whole period of gestation and lactation. Hereditary diseases are generally transmitted by the mare. The rule, then, for the production of sound colts is exceedingly simple. Keep the mare healthy. The rule extends through the entire period of gestation and lactation.

I do not hold that every disease of the parents will be transmitted to the colt. Some fine colts are raised by feeble mares, although such is by no means the rule. Unhealthy parents in favorable conditions of procreation may produce healthy offspring. But if only healthy parents produce colts, and that, too, with a strict compliance with the conditions of procreation, the result will be a steady improvement in quality, and the gradual breeding out of physical corruptions. Youatt says: "There is scarcely a disease by which either of the parents is affected that the foal does not inherit, or, at least, show a predisposition to. Even the consequences of ill-usage or hard work will descend to the progeny. There has been proof upon proof that blindness, roaring, thick wind, broken wind, spavin, curb, ringbone, and founder have been bequeathed to their offspring both by the sire and their dam." The animal races will never attain sound bodies until the people have learned how to breed healthy progeny. We have made considerable progress in the procreation

of cattle, but we come far from fully observing the laws of life in procreation.

The dam should possess broad hips, a large abdomen, or space from the hips to the shoulders. In size, form, and motion she should be of the perfect symmetry and model of beauty. These last conditions are not always necessary, however. I have seen a beautiful colt from an ill-shaped mare. In such cases the foal partakes chiefly of the constitution and disposition of the mother, while its form and size are derived mainly from the sire. This is not the rule, however.

If well developed, the filly may be bred at three years of age, but many are immature at this age, and should not be bred until four. The custom of breeding two-year-old fillies cannot be too greatly condemned, for at this age they are not qualified to breed satisfactorily. It will greatly retard growth and development, and may injure form and beauty for life. It is best to breed the mare every other year until she is fifteen years old. If bred every year she will fail more rapidly. As a general rule it is not best to continue breeding her after she is twelve or fourteen years old.

STERILITY OF THE MARE.

A mare's sterility is practically decided in the first three years of her breeding life. But she should not be considered sterile until she has been served by at least three horses. There may be an unsuitableness of the organs of generation, an unfavorable temperament or incompatibility of constitution which would disqualify them for reproduction.

CAUSES OF BARRENNESS.

The causes of barrenness may be from congenital deformities, as malformation of the uterus or absence of the fallopian tubes. These conditions cannot be corrected. It may be caused by the obliteration of the neck of the womb, sealing up of its mouth, or inflammation, resulting in adhesions of the walls of the vagina. The greatest cause of sterility in the mare is disease of the ova-

ries, which prevents them from maturing healthy germs. Chronic inflammation of the neck of the womb and vagina gives rise to secretions which destroy the vitality of the spermatozoon. Tumors in connection with the ovaries, fallopian tubes, uterus, neck of the womb, or any disorder of the uterine functions may disqualify for breeding purposes.

The treatment of these diseases will be given in the future pages of this work.

ARTIFICIAL PREGNATION.

If sterility of the mare or cow be due to sealing of the mouth of the womb, the condition can be corrected. This is often the cause of sterility. The operator should provide a pail of warm water, carefully heated to the temperature of 103 degrees. In this place a long glass syringe a half inch in diameter. The fever thermometer should be used for taking the temperature of the water. The operator, greasing or oiling his hand, may enter the vulva, pass the hand along the floor of the vagina until he reaches its extremity. Here, just above the floor of the vagina, is a well-marked constriction—the neck of the womb. The forefinger, previously saturated with belladonna, should now be gently pressed into the os uteri or neck. The manipulations should be carried to the extent of admitting the ends of three fingers. The subject should now be allowed to copulate. Immediately after its termination, the operator should get his syringe, which has not been allowed to cool, and, entering the vagina, should draw from its floor the elements deposited during copulation. Without withdrawing the syringe, he should carry it to the neck of the womb, press the syringe well up in the neck, and inject with considerable force. In some cases it may not be necessary to use the syringe, dilatations of the os uteri being all that is necessary, but the neck is often left in such condition that it cannot perform its natural functions, generally necessitating the use of the syringe.

IMPERFORATE HYMEN.

The hymen is a circular membrane which closes the outer orifice of the vagina in the virgin. This membrane is ruptured during the first act of copulation. Normally the hymen has a small perforation at its upper anterior portion through which the menstrual fluid exudes.

The author has operated on fillies where the membrane was not perforated, and the membrane so thickened and strong as to render sexual intercourse impossible. The condition is seldom discovered before puberty. When this period arrives the menstrual discharge takes place. The animal suffers great irritation from retention of the menstrual discharge. She will strain and rub the parts against the stall continually. When straining violently the membrane can be seen without exploring the parts. This condition, seldom seen should be entrusted to a skilled veterinarian.

TREATMENT OF THE MARE WHILE PREGNANT.

The care and feeding of the mare while with foal is an important matter. She affects the foal either for good or evil through all of her conditions during the period of gestation and lactation. A life of duty is most conducive not only to the health of the mare, but to that of the offspring as well. This cannot be too strongly borne in mind. She should be protected from everything likely to create disturbance of her nervous system. A sudden gust of passion, fear, or excitement will tell upon the offspring. And it must be remembered that pregnancy occasions in some mares, in the early months, a very excitable state of their nervous system, yet without disease. In consequence of this continued irritation, the temper of such animals is sometimes rendered less gentle and patient than is consistent with their usual character. Bear this in mind, and do not cuff them about. The low, damp, dark stables of our cities, sometimes under ground, are sources of great mischief to the pregnant

mare. The stables should be light, airy, and free from contaminating influences. Any neglect, exposure, and abuse will tell upon the young animal. The mare should do light work up to within five or six weeks of foaling, at which time she should be relieved of all service until a month or six weeks after foaling. As she nears the time of foaling she should be removed from other animals and kept where she can be watched, so that if any difficulty arise during parturition assistance may be obtained promptly.

After thirty days the mare may again be put to the horse; but, as said before, it is best to breed every other year. Pregnancy alters the character of the milk. It is evident that a small number become pregnant during lactation. Sr. Trall says: "That conception should not occur during lactation is very clear. It is certainly not in accordance with physiological law, nor is it probable that a woman while nursing one child will develop so perfectly the ovum for another."

Grass when it can be obtained is the best food for the mare. If in the time of pasture she will need but little grain. In the latter month of gestation the food should be increased. The mare then has both the foal and herself to support. She should never be allowed to fall off and become poor, and on the other hand a plethoric condition is objectionable. The food given should be of the best quality in order to make pregnant mares healthy, to strengthen them generally and locally.

PARTURITION.

This is performed in the mare in its natural way with no suffering. It is a perfectly natural function with them, as it should be with all living creatures. All females in perfect health pass through their time of trial with comparative ease. Nature never intended that they should be tortured when fulfilling her laws. The perversion of nature's laws has brought about suffering in the human family. The only cases accompanied with suffering in the mare are where her body is diseased, or where she has

associated with a horse larger than herself. In severe cases anæsthetics should be used to relieve pain. When there is difficulty in producing the fetus, recourse should be had to the ergot of rye. Half-ounce doses should be given every half hour. The manipulation should be gentle and continued, using as little force as possible. The mare should be assisted gently during each labor pain. If after a certain time some progress has been made with the ergot, it may be suspended for awhile; but if all progress is evidently suspended recourse must be had to the parturition instruments. Such cases should be intrusted to the veterinary surgeon, as he will have perhaps the proper instruments to make the case easy and free from danger of injury to the mare. The abnormal presentations of the fetus in the lower animals are frequent, and found in almost every conceivable shape. Monstrosities are sometimes met with. By this is meant a deformed fetus. Such can only be removed by the performance of embryotomy, and should always be entrusted to the surgeon as early as possible. In some cases it is advisable to perform the Cæsarian operation, a removal of the fetus from the side. Occasionally labor pains come on and persist for a considerable length of time, but it is observed that, instead of being strong and powerful as they should be, the contractions are weak and inadequate to the task of expelling the fetus. In such a case the bladder and rectum should be emptied and stimulants administered. Pressure may be applied in the region of the uterus, the os uteri should be smeared with belladonna tr. and ergot of rye used. Injection of tepid water into the vagina is of great assistance.

After delivery, if the umbilical artery does not sever of its own accord, it should be ligatured by a silk cord about two inches from the umbilical opening and severed from the fetal membranes.

Retention of the Placenta.—Retention of the placenta beyond a reasonable length of time frequently occurs. The symptom generally present in such case is the umbilical cord hanging

from the vulva. It should not be removed immediately after birth of the young animal, as it may come away of its own accord in the course of twenty-four hours.

Savan, laurel, anise seed, soda carbonate, etc., have been recommended, but their efficacy, to say the least, is doubtful. To remove them the surgeon must oil his arm and carefully manipulate the attachment of the envelops from the uterus, and remove them by breaking the attachments with the fingers. The membranes should never be pulled away. Where this is done the animal dies from its effects.

IV.

THE COLT.

The animal is a foal, irrespective of sex, from birth until weaned; a weanling, when weaned, until it becomes a yearling. The male animal is a colt until the mouth is made or until castrated: custom has, however, accepted the first indication of the corner teeth, or four years, as the age at which he becomes a horse; a gelding, after castration, at any age; a horse, or stallion, after the mouth is made, or earlier, if he stands for service; a ridgling, if one testicle has not descended to the scrotum. The female is a filly until the mouth is made or until bred; a mare, after the mouth is made, or sooner, if bred.

The ass is a foal until weaned; after that the male animal is a jack; the female animal is a jenny. The male mule is known as a jack mule irrespective of gelding, and the female as a jenny mule. The hybrid foal of the male ass and the mare is the true mule. That between the stallion and the female ass is called the hinny.

Cattle.—The animal is calf until six months old, the natural time for weaning; a bullock or bull is the male animal; a steer is the castrated male cattle. He is called an ox calf or bull calf until twelve months old; a steer until he is four years old, and after that an ox or bullock. A stag is a castrated male; a heifer is a female until bred, or until the mouth is made; a cow is the female after breeding, or when the mouth is made.

Sheep.—The animal is a lamb until a year old; a ram or a tup when over eighteen months old, and has its first intermediate permanent teeth. A ewe, when female over eighteen months old and with its first temporary teeth. A wether, when a castrated male. A hog, hogget, is the young sheep before it has been shorn.

Swine.—The young animal is a suckling until weaned; a roaster from four to eight weeks old; a pig until a year old, male or female. A porkling is a young hog or pig of either sex. A boar is the adult male; the sow the adult female. A shoat is a growing young hog; a barrow is a castrated hog; a farrow is a litter of pigs.

Goat.—The animal is a kid until a year old; a billy is the male and the nanny is the female.

Dog.—A puppy is the young animal. A dog is the adult male; a bitch or slut is the female.

Chickens.—A cock is the male; a cockerel is a young cock; a stag is a young game cock; a capon is a young castrated male; a hen is the female; a pullet is the young female.

TREATMENT OF THE COLT.

The little colt when four or five days old frequently suffers with indigestion, and if not attended to will die in a short time. This is due to changes in the mother's milk, the treatment of which will be found in other chapters. If the mother is worked on the road, the colt should not be allowed to follow her. If allowed to travel on hard roads, it weakens the limbs and causes ringbones and spavins. He may, however, be allowed to accompany the mother on short trips. The colt, if strong, may be weaned when six months old. If the youngster is thin and weakly he may be allowed to suck longer. Fall colts should always be allowed the mother's milk till the grass comes on in the spring. The little colt should never be weaned during the severe cold of winter. At weaning the colt should be removed from the sight and hearing of the mother. By this course she will soon become reconciled to her loss. The mare should be milked a few times after the colt has been taken away and the glands bathed with the tincture of belladona. This will dry up the secretion of milk and prevent inflammation. The little colt should be allowed to eat while sucking his mother. A little box should be placed along by the side of his mother, where he can

easily reach it. He will enjoy a nice chop feed, and it will help him out considerably when he is being weaned. The colt should receive the best of attention during the time of weaning and while he is young. Bad treatment at this age will weaken him for life, and he is too frequently a victim of cruel neglect. Unsheltered from the bleak winds and snows of winter, his vital energies receive a shock from which he will never wholly recover. He not only loses a year's growth, but is injured for life.

COLT AT FIVE DAYS.

The foal's education should begin when he is five days old. The foal may be educated as well as the child, and wise people have said that it is never too early to begin. The rules which govern in the human are applicable to the lower animals. The prevailing practice among farmers and stock-raisers is to let the colt remain unbroken until he is considered of suitable age to be put to work. This is not only a dangerous method to the colt, but to the trainer as well. A great many are spoilt or injured so that they are always unreliable to work, or rendered unfit from the abrupt manner in which they are brought into services. We cannot too greatly condemn this practice. If the stock-raiser would take into consideration the amount of money lost he would at once lay aside his old methods. He disposes of his colt at a great sacrifice, probably one-third of its value, rather than go through with the ordeal of breaking. If the little colt is trained at the proper time, and the training carried out until he becomes a horse, he will never know what breaking means. Take him in hand at once and gentle him. Never let him know what fear is, and yet you must control him. There should never be a time when the colt does not recognize the mastery of his keeper and the necessity for obedience. Be gentle and kind to him, allowing him to examine you thoroughly. Whatever he understands to be harmless he does not fear. In moving up to him, if he should show fear, be gentle and move carefully, and he will soon comprehend that you are harmless, if allowed the privilege of exam-

ining and understanding you in his own way, by smelling and breathing with the nose. At this age the little animal should not know that such a thing as a whip exists. If you strike him with the whip, he will probably shy from you and the whip as long as he lives. You should teach him to love you, which he will readily do if kindly treated. His affection for his master is not as strong as that of the dog; if you cruelly treat him or whip him he will lose his affection for you, while the dog may be whipped and will even love you better. Now that you have gotten up to him, and he has learnt that you will not hurt him, pat and caress him. Handle him every day until he is perfectly gentle and knows no fear. It is at this early age that most of the vices of the mature horse are begotten. If the colt is left to himself without proper training, he will just as certainly run into bad habits and those vices which so much detract from the value of many horses. The fundamental law of education applies to the colt, and as "a child left to himself bringeth his mother to shame," so a colt left to himself bringeth his master into trouble.

The little colt forms bad habits at this age, and if not prevented or broken while young the habit becomes strengthened by long continuance. Some habits formed in the adult can never be broken; for instance, the crib biter, wind sucker, and weaver. It is much easier to keep the colt from acquiring ugly tricks than it is to break mature horses of any settled vice. If the work of educating the colt be neglected, no subsequent pains will likely make good the deficiency. The colt of three or four years, unbroken and untamed, is like the youth who has never known parental control. He forms such tricks as backing, shying, kicking, rearing, running away, breaking the halter, continued restiveness; is vicious, nervous, fretful, kicks in the stall, and can seldom be taught to stand without hitching. We must win the colt's confidence, which may be done by uniform actions of a kindly disposition. He takes man exactly for what he proves himself by actions. By kind treatment he learns to associate with

man's feelings of protection and security, and he can have no fear or doubt, because never taught to doubt by deception.

The stock-raiser should decide what his colt is best suited for, what place he shall fill, and then conduct the whole process of training with a view to the especial purpose selected. It may be laid down, as a rule, that the colt is susceptible of training for whatever service is desired of him, and that no failures would occur if his peculiar adaptedness were properly studied and understood. We may mould and fashion his disposition, control his actions, teach him obedience and submission, and habituate him to the performance of whatever duty is deemed best for him. If properly trained, he will be safe and true and free from vice in almost every instance. The colt now should frequently have his legs lifted, his head and ears handled, his neck and body stroked. All this he should be perfectly familiar with before weaning. The bridle may now be put on, simply allowing him to champ the bit awhile on the first occasion. After he has become accustomed to wearing it by having it put on three or four times, he may be lead about with it a little longer and further each time. The first few times this is done it should be by the side of his mother, and while she is being led along; then he may follow at a little distance behind her, and presently he may be taken a few paces in advance of her.

HOW TO LEAD THE COLT WITH A BROKE HORSE.

Having the mare and colt in the stable, attach a second strap to the colt's bridle or halter, and lead the mother up alongside him. Then get on the broke horse and take one strap around his breast under the martingale (if he has any on), holding it in your left hand. This will prevent the colt from getting back too far. Take the other strap in your right hand to prevent his running ahead; then turn him about in the stable, and if the door is wide enough, ride out with him in that position; if not, take the broke horse out first and stand his breast up against the door, then lead the colt to the same spot and take the straps as before directed,

one on each side of his neck, and then let some one start the colt out, turning your horse to the left. Any kind and aged colt may be managed this way without trouble, for if he tries to run ahead or pull back the two straps will bring the two facing each other, so that you can very easily follow up his movements without doing much holding. If he gets stubborn and does not want to go, you can remove all his stubbornness by riding your horse against his neck, thus compelling him to turn to the right, and as soon as turned about a few times he will be willing to go along. He may now be haltered. The rope halter should not be used. A good, strong leather halter should be used so as not to hurt his mouth. Be as kind and gentle toward him as possible, but always continuing the attitude of master. He must be made to understand that his master's will is his highest law, and that no alternative is open to his choice. Do not suffer him at any time to obtain any advantage in pulling about by the halter or bridle, or in running away. The latter occurrence even once may nearly ruin him. It will take months of careful management to correct its evil effects, and often it forms the beginning of a series of bad habits.

HOW TO PROCEED WITH THE COLT AFTER HALTERING.

Stand on the left side, pretty well back to his shoulders, taking hold of that part of the halter that goes around his neck, then with your two hands about his neck you can hold his head to you and raise the halter on it without making him dodge by putting your hands about his nose. A long rope should be ready, and as soon as you have the halter on, attach this to it so that you can let him walk the length of the stable without letting go the strap. When he runs from you it is best to give him rope. By doing so he will not rear up or throw himself, and still you will be holding him and doing more towards gentling him than if you had the power to snub him right up and hold him to one spot. In a few minutes you can begin to control him with the halter; then shorten the distance between yourself and the colt by taking up

the strap in your hand. As soon as he will allow you to hold him by a tolerably short strap and to step up to him without flying back you can begin to give him some idea about leading. In doing this pull him to one side. This can easily be done. When he steps to one side pat and caress him and repeat until you can walk about the stable with him. If he is given several lessons of this kind at proper intervals he will become so tame that he will come to be caressed while out in the pastures.

HOW TO PROCEED WITH THE BRIDLE.

To accustom the colt to the bit, you should use a large, smooth snaffle, with a bar at each side. This should be attached to the head stall of the bridle; put it in without any reins, and let him run loose in a large stable for some time. Repeat this several times. Reins should then be attached to the bit, and the animal handled with the bit until he is thoroughly accustomed to it.

TO ACCUSTOM HIM TO THE SADDLE.

The saddle should now be brought out. The first thing is to tie each stirrup strap in a knot to make them short, preventing them from flying about and hitting him. Then double up the skirts and take the saddle in your right arm so as not to frighten him with it when you approach. When you get to him, rub him gently a few times with your hand, then raise the saddle very slowly until he can see it and smell and feel it with his nose. Then let the skirts loose and rub them very gently against his neck, the way the hair lays, letting him hear the rattle of the skirts and feel them against him, each time a little further backward, and finally slip it over on his back. Shake it a little with your hand, and in less than five minutes you can rattle it about over his back as you please, pull it off and throw it on again without his paying much attention to it.

As soon as you have accustomed him to a saddle, fasten the girth. Be careful about this. It often frightens the colt when he feels the girth binding him. You should bring up the girth

very gently and not draw it too tight at first, just tight enough to hold the saddle on. Move him a little and then girth it as tight as you choose, and he will not mind it. You should then lead him about the stable a few times and remove the saddle and replace it again. The saddle should not have any loose straps about it to flap about and scare him. After he becomes thoroughly accustomed to the saddle, and is not afraid to see you anywhere about him, and will follow anywhere you want him to go with the saddle on, you may now proceed to mount the colt.

HOW TO MOUNT THE COLT.

You should always be alone and have your colt in some light stable the first time you ride him. You should pass all around him, move the saddle skirts, and see that they cannot frighten him. You may now place a block by the side of the colt and get on the block. If he becomes frightened at your appearing higher than usual repeat the lesson until fear is removed. Lean on the saddle put your foot in the stirrup, and allow him to bear your weight. Allow your knees to rest against him and your toe to touch him under the fore shoulder. Repeat this several times, or until the horse becomes thoroughly accustomed to it. You may now raise your leg over his croup and he will not become frightened. When you take these precautions there is no horse so wild but that you can mount him without making him jump. I have tried it on the worst horses that can be found, and have never failed in any case. When mounting, your horse should always stand without being held.

HOW TO RIDE THE COLT.

When you want a colt to start do not touch him on the side with your heel or strike him with the whip. At once speak to him kindly, and if he does not start pull him a little to the left until he does so, then let him walk off slowly with the reins loose. Ride him around in the stable, turning him from side to side until he becomes used to the bit. Get on and off until he will

stand when you get into the saddle. Get on from both sides until he becomes thoroughly familiar with the movements and will not move. After you have trained him this way for several hours you can ride him anywhere without having him jump or make an effort to throw you. When you first take him out of the stable be very gentle with him, as he will feel a little more at liberty to jump or run, and be easier frightened than while in the stable. When you mount a colt take a little the shorter hold on the left rein, so that if anything frightens him you can prevent him from jumping by pulling his head around. This operation of pulling a horse's head round against his side will prevent him from jumping ahead, rearing up, or running away. If he is stubborn and will not go, you can make him move by pulling his head around to one side when whipping would have no effect. Turn him around and around until he becomes dizzy, then let him have his head and give him a little touch with the whip, and he will go along without any trouble. The martingale should never be used while the colt is learning. He should now be perfectly gentle and familiar with the halter, bridle, saddle, and the different parts of the harness, and should be accustomed to follow readily, when led by either the halter or bridle, and to stand tied either in company with other horses or alone. The colt should now be tied by the side of some old and steady horse in the shafts and led along until he becomes familiar with the harness, shafts, buggy, and feels that he is quite in his line of duty. He must now be taught the use and guidance of the lines. The lines should be transferred to the colt, and with some one to lead let him be driven around for awhile in company. This should be done until he is thoroughly accustomed to it. He may now be put in the shafts, which should be gently lowered upon his side. The buggy should be pulled along with the colt in the shafts for a distance, then the traces may be fastened. He will now take his first lesson in drawing the buggy, which is to be commenced slowly and carefully. First move the old horse along, when the colt will naturally move off also; he should not

be allowed to stop until he becomes evidently tired. The old horse throughout this exercise should have a saddle on and the bridle over his neck ready for riding. If the colt moves off freely and kindly, after a few minutes let the person at the head lead the old horse a little way in advance, gradually increasing the distance until he is several lengths ahead of the colt in the shafts. Without stopping the old horse, let the assistant now spring into the saddle and keep lengthening the distance between them, until at length the old horse is taken entirely out of sight of the colt. During these lessons he should be taught to stop, start, and back. It will be a little difficult to teach him to back. Have him back only a few steps at first, gradually increasing until he backs readily. All of these performances are designed to accustom the colt to the bridle, the harness, the shafts of the buggy, and the guidance of the lines, and to complete the work of gentling before he has strength or inclination to disobey. He should take his lessons frequently, but without requiring from him any real labor while young and tender. His health at this period should not be neglected. He now begins cutting his permanent teeth. In children a similar irritation is caused by the cutting of deciduous teeth. This interferes with his feeding. He often cuds his food and wastes more or less of it. The gums are reddened by an excess of blood, swollen and tender. The irritation may extend to and cause a slightly deranged condition of the stomach and bowels, giving rise to constipation, diarrhœa, etc. Good wood ashes with plenty of salt kept constantly in the feeding troughs will have the happiest effect in abating the evils referred to and in mitigating the suffering of colthood. Sulphur should be fed also. This has a good effect on the colt in two ways—preventing disease and keeping away lice of every description that so frequently infest the young colt when not in good condition. His food should be similar to that described for the weanling, except that it should be given in larger quantities. This is the most favorable time for castration, which will be discussed at length in the future pages of this work.

THE COLT—HIS EDUCATION AND CARE AT TWO YEARS OLD.

During the third year, the colt should be continued in the same training as before, and occasionally he may make short trips in the buggy. His work should be light during this year. He should not be driven or worked hard. This is the time to train him for the saddle. A person of small weight may get on his back, but no attempt should be made to ride him until he has been frequently mounted. His lessons should follow in the natural order until he has been ridden, and then he should be ridden often, not merely for the purpose of gentling him, but to accustom him to the road and the different objects to be met with along the way.

BREAKING YOUNG COLTS.

It is much to be regretted that farmers and stock-raisers do not appreciate the importance of attending to the work of gentling and training during the susceptible years of the colt age If they would carry out the system of gentling and training as previously laid down in this work, the subject of breaking would not have to be here dealt with. While this is not done by many farmers and stock-raisers, the colt must not be neglected and given over as untamable and useless.

The old method that has been handed down to our farmers for ages is a very rough, dangerous, and not always a successful one. The colt is brought up, thrust into the wagon; his rearing, kicking, and plunging must be endured until, from exhaustion, the animal is reduced to some degree of obedience. This method, however, I am glad to say, is being abandoned for other and more rational modes. The best known method of breaking, and that which has proven the most successful in my own hands, is that known as the Rarey method.

RAREY METHOD.

This method consists in conquering the animal by depriving him of the use of his limbs and making him feel that he is utterly

powerless in the hands of the operator, and must submit to whatever is required of him. In other words, it carries the horse or colt through a rapid and vigorous course of training, which is both systematic and severe, and at the same time embraces in a short space of time all the essential lessons that are to be taught him. This method was first instituted by the late John S. Rarey, of Grovesport, Franklin county, Ohio, although it was not solely original with him. His experience in training in this country has been very extensive and successful. In the year 1852 he went to England, and created such a sensation there that it is said the gross proceeds of his exhibitions, lessons, etc., amounted to the sum of £25,000, or about $120,000. Mr. Rarey won his reputation as a trainer by observing the natural laws that govern horses. He exercises reason and patience in teaching and controlling them, and has but little use for the whip. While his method of taming the wild and vicious horse is rapid and severe, it is the most humane and gentle system known. Mr. Rarey uses an ordinary halter or head-stall, with the addition of his breaking bit, for all purposes. He attaches a leading strap to the nose-band, either before or behind. The bit is a straight bar bit, four and a half inches long between the rings, with side bars. The method of converting the halter into a breaking bridle consists merely in attaching any bit that may be selected to the rings connecting the check pieces to the nose band. The attachment is made by means of two small billets and buckles. The first step is to halter the animal. To do this Mr. Rarey and his pupils are said to have resorted to the use of drugs. They rub a little oil cummin upon the hands and approach the horse on the windward side, so that he will smell the cummin. "The horse will permit you to come up to him without any trouble. Rub your hand gently over the nose, so as to get a little of the oil on it, and you can lead him anywhere. Put eight drops of the oil of rhodium into a silver thimble; very gently open the horse's mouth and turn the oil in the thimble upon his tongue, and he will follow you like a pet dog, and is your pupil and your friend." He says

"that there is nothing that assists the trainer to tame his horse better than smelling oil." He says "it is better to approach a colt with the scent of honey or cinnamon upon your hand than the scent of hogs, for horses naturally fear the scent of hogs, and will attempt to escape from it, while they like the scent of honey, cummin, or salt." The effect of drugs in horse-training is of doubtful efficacy. The trainer should not place too much confidence in these supposed benefits. To affect the horse with drugs, you must give him some preparation of opium, and while he is under the influence of it you cannot teach him anything more than a man when he is intoxicated with liquor. In using the anæsthetics, such as ether, chloroform, gas, etc., the effects would be similar; the horse on recovering from the effects would be no further advanced in his lessons; yet it is admissible, perhaps, to use essences to catch a brute otherwise unapproachable. After the horse is bridled, the next step is to throw him on his side. To throw a horse, put a rope 12 feet long around his body in a running noose, pass it down to the right fore foot through a ring in a spancil; then buckle up the left or near fore foot, take a firm hold of the rope, lead him around until he is tired, give him a shove with your shoulder, at the same time drawing up the right foot. This brings him on his knees; hold him as steady as possible, and in a few minutes he will lie down. Never attempt to hold him still, for the more he scuffles the better. If the operator be an active man, he will have no trouble in casting the animal, and after a little practice will be able to cast the animal with ease. When down, rub and caress him, treating him with the utmost gentleness, and every effort should be made to quiet his fears and soothe his excitement. He must be convinced that although completely mastered, he is in no way to be hurt. The operator should stroke his hair with the hand; pat his body, neck, and head; handle his feet, legs, and ears, thus manipulating every part of the body. The operator may now sit down upon him and get all over him. The more motions and changes that can be gone through with the better. The harness should be rubbed

over him, the saddle laid on him; the chains rattled over him, if used. Continue this until all symptoms of fear have departed, then allow him to get up. When on his feet, place the saddle on his back and each piece of harness. If he scares or jumps, take them off and cast him as before. Bring the buggy and allow the wheels to pass around him where he can see them; lay the shaft on him. Continue this method until he is perfectly familiar with the saddle, harness, and buggy. Whatever you undertake to teach him, persevere in the instructions until you succeed. The horse must be thoroughly conquered at the outset; unless this is done, it will be a somewhat prolonged course before he is brought under proper subjection. Allow no harsh word or measures of any kind. Let all your handling of him be gentle and soothing, remembering that the law of kindness is always more potent than that of force. The directions given for breaking the young colt to shafts, hitching, saddling, etc., will apply none the less here.

There is another very good method of taming the wild and vicious horse by the use of the knee strap. When you desire to subdue a horse that is very wild, or has a vicious disposition, take up one forefoot and bend his knee till his hoof is bottom upwards and nearly touches his body; then slip a loop over his knee and shove it up until it comes above the pastern joint, being careful to draw the loop together between the hoof and pastern joint with a second strap of some kind to prevent the loop from slipping down and coming off. This will leave the horse standing on three legs; you can now handle him as you wish, for he cannot do much in this position. There is something in this operation of taking up one foot that conquers a horse quicker and better, considering the trouble, than anything else, and there is no other process equal to it for breaking a kicking horse, for by conquering one member you conquer, to a great extent, the whole horse. When you first fasten up a horse's foot he will sometimes get very mad, and striking with his knee and trying every possible way to get it down, but as he cannot do that he will soon give up and abandon all antagonistic demonstration,

willing to obey and be generally docile. Operate on your horse in this manner as often as the occasion requires, and you will soon find him as gentle as his nature will permit. This method of conquering the horse is less trouble and less danger to the operator than any known, for after you have tied up his foot you can sit down and look at him until he gives up. When you find he is conquered, go to him and let down his foot, rub his leg with your hand, caress him, and let him rest a few minutes, then put it up again. Repeat this a few times, always putting up the same foot, and he will soon learn to travel on three legs, so that you can drive him some distance. As soon as he gets a little used to this way of travelling, put on harness and hitch him to a sulky. If he is the worst kicking horse that ever raised a foot, you need not be fearful of his doing any damage while he has one foot up, for he cannot kick, neither can he run fast enough to do any harm. If he is the wildest horse that ever had harness on, and has run away every time he has been harnessed, you can now hitch him to a sulky and drive him as you please. If he wants to run, you can let him have the lines, and the whip, too, with perfect safety, for he can go but a slow gait on three legs, and will soon be tired and ready to stop. Thus you will effectually cure him of any farther notion of running off.

This method is the best known for breaking a kicking horse. There are plenty of ways by which you can hitch a kicking horse and force him to go, though he kicks all the time, but this does not have any good effect towards breaking him, for we know that horses kick because they are afraid of what is behind them, and when they kick against it and it hurts them they only kick harder. By the new method you can harness them to a rattling sulky, plow, wagon, or anything else in its worst shape. They may be frightened at first, but cannot kick or do anything to hurt themselves, and soon finding that you do not intend to hurt them, they will not care anything about it. You can then let down the leg and drive along gently without any further trouble.

The kicking horse can be taught to be gentle in harness in a few hours' time.

THE EUREKA BRIDLE.

While a pupil of Prof. O. R. Gleason, who has great reputation in this country and abroad as a horse trainer, we were taught to use the Eureka bridle in leading and handling the colt. It is the most powerful means of learning the colt to lead. There is one objection to the use of it, however, in the training of the innocent colt, for persons are apt to be inconsiderate in its use. Instead of using it with utmost mildness, a little resistance on the part of the colt is made an excuse to use it in the most severe manner, until the colt either submits unconditionally or becomes so desperate with pain as to be entirely reckless.

HOW TO MAKE THE EUREKA BRIDLE.

Take a sash cord or a small hemp rope about three-eighths of an inch. Let it be about fifteen feet long; tie one end into a hard knot just as you would to prevent its raveling; tie another knot about ten inches or a little more from the one on the end, but before you draw it tight put the knot on the end through. You have now a loop that will not slip, made on the principle of the hitching rope tied around the neck of the horse so as not to tighten upon the neck by pulling. This loop should be just large enough to slip over the under jaw; put this loop over the lower jaw while standing on the near side, take the cord in the left hand, and bring over the neck by passing the left hand under the neck to the opposite side towards the mane; bring the right hand over the neck and take the cord from the left and pass back to the loop, and put through from the top side until the part over the neck is drawn like a check rein; now take hold of the end of the rein, and you have a means of power in it that makes the strongest horse almost a plaything in your hands. In using the Eureka bridle as a means of subduing the colt, it is best to use the knee strap, tampering him on three legs. As soon as he submits cleverly to this step, instead of fastening up the

leg by the method already described, take off your strap. Then put on the Eureka bridle gently and step to one side and back and say, "Come here, sir!" pulling a very little upon the bridle, just enough to bring his head towards you a little. Now step up to him and pat him on the neck, saying, "You are a fine fellow." Then try again the same way, and so repeat until he will come quite freely; you may increase your force upon the bridle in proportion to his submission, but not if he shows stubbornness. You may then step to the other side and repeat the lesson until he will come to you either way cheerfully. When you wish him to follow, continue your training in this way, gradually pulling a little more on a line with his body, until he will follow as well ahead as he does sideways.

HOW TO MAKE A BITTING BRIDLE FOR AN UNRULY HORSE.

Take the Eureka bridle already described and fix a loop upon the other end like that already used to put around the jaw, but big enough to go over the head and fit over the neck, rather tight, where the collar is worn. Now bring the cord forward, put through the mouth from the off-side, and bring back on the near side and put through the loop around the neck. Pull upon this cord and the head will be drawn back to the breast. You are now prepared to bit. Simply pull upon the cord a little, which will draw the head back slightly; after holding for a short time, render loose; then draw up a little tighter, and so repeat for four or five minutes. Then stop bitting, and repeat at some future time till you have the horse under your control.

THE STUBBORN HORSE.

If the animal you are operating upon seems to have a stubborn or mulish disposition rather than wild; if he lags back his ears as you approach him, or turns to kick you, he has not proper regard or fear of man, and it might do well to give him a few sharp cuts, with the whip, about the legs pretty close to the body. It will crack keen as it plies about his legs, and the crack of the

whip will affect him as much as the stroke. Do not whip him much, only enough to scare him. But whatever you do, do quickly and with a good deal of fire, but always without anger. If he does right, pat and caress him. If he does wrong, give him the whip. As soon as you have frightened him, so that he will stand up straight and pay some attention to you, approach him again and caress him a good deal more than you whipped him; thus you will excite the two controlling passions of his nature, love and fear; he will love and fear you, too, and as soon as he learns what you require he will obey quickly.

If the horse is of too mulish a disposition to yield to careful and gentle treatment as here given, you must resort to the several measures recommended for taming vicious horses.

HOW TO GET A COLT FROM PASTURE.

Go to the pasture and walk around the whole herd quietly, at such a distance as not to cause them to scare or run. Then approach very slowly; if they stick up their heads and seem to be frightened, wait till they become quiet, so as not to run them before you are close enough to drive them in the direction you want them to go. When you begin to drive do not flourish your arms or halloo, but gently follow them off, leaving the direction free you wish them to take. Thus taking advantage of their ignorance, you will be able to get them to the pound as easily as the hunter drives the quails into his net.

KICKING IN STALLS.

To cure a horse of this habit, put on the saddle part of a carriage harness and buckle on tightly. Then take a short strap, with a ring attached, and buckle around the forward foot below the fetlock. To this short strap attach another strap, which bring up and pass through the turret; then return to the foot and run through the ring in the short strap. Then pass over the belly-band and tie to the hind leg, below the fetlock. With this attachment on each side, the moment the horse kicks he pulls his

feet from under and trips himself upon his knees, which he will be very careful not to do after a few times.

HALTER PULLING.

Put on the Eureka bridle, as before described, and train the horse about until he will come to you readily when you pull him a little sideways. Simply repeat this, gradually a little more on a line with his body at each repetition, until he will yield as readily at being pulled forward as sidewise. Then tie a rope around the body where the harness saddle rests. Now lead the horse to his manger or to a post, run the halter strap through the ring or hole, and pass back between the forelegs over the strap or cord tied around the body, and tie to the hind leg below the fetlock. If your halter strap is not long enough, splice a piece to it. When you have him fastened, step forward to his head and make him pull. He will go back with a rush and try his uttermost to break it, but the moment he attempts going back the halter pulls directly upon the hind leg, which not only disconcerts, but makes it impossible for him to pull. When he comes up from trying the halter, you should meet him with a tap on the nose. He may then try it the second time. Continue as often as he will go back. They seldom try it more than twice.

TO TRAIN A HORSE TO STAND WHILE GETTING INTO A CARRIAGE.

If he rears up and starts very suddenly, or will not stand long enough to get in and be seated, do not whip him for it. This only adds to the trouble, and may make him stubborn, so that he will refuse to start when called on. Rather, after he is hitched, caress him about the head, then take hold of the reins and put your foot on the step and shake the carriage; if he starts, pull gradually on the reins, and at the same time speak low, "Whoa, my boy," or something like it. Then approach his head and give him a piece of apple, caress him on the head between the eyes and on the nose and neck; continue this kind of treat-

ment a few minutes; when mounted, do not allow him to start off in a hurry—walk him off. After practicing this a few times he will be perfectly submissive.

HOW TO CURE BAD KICKERS.

For extremely bad kickers, or horses bad to shoe, the following method will be found effectual. Put on a common rope or strap halter, with a hitching rope or strap about twice as long as the animal's body. Have around the body a common rope or surcingle. Then pass the rope or strap between the forelegs over the surcingle, back around the hind feet, below the fetlocks, and forward over the surcingle between the legs, and tie short into the halter beneath the jaws. Now make him kick, and he will yield readily.

HOW TO MANAGE BALKY HORSES.

Free-going and high-spirited horses are the ones more liable to become balky. The cause of this is due to drivers who seem to believe that all horses have the same dispositions and should be treated alike. When a horse balks it is from some mismanagement, excitement, or from not knowing how to pull, but seldom from unwillingness to perform all that he understands. When you find a balky horse, you will always find him a free goer, or he is hitched by the side of a slow horse, and the driver an impatient man and usually possessing a small amount of common sense. The anxious horse can scarcely wait until he is called on to go, and when the driver, who scarcely knows a horse from a cow, bawls out for them to start, he springs forward against the load, which gives him a severe jerk on the shoulders, causing him to fly back and jerk the slow horse that is just now getting started. The driver bawls out again, and the free horse springs up again, but the load does not move, leaving them confused and not knowing how to start the load. Now the driver flies into a passion and begins whipping and slashing and hollowing until the poor animals are so confused that they know nothing. The driver, who is whipping, knows less and has lost all reason and

common sense. To scare the already frightened horse is surely not the correct method to pursue, and to whip the confused horse is equally as bad. There is hardly one balky horse in five hundred that will pull truly from whipping; it is only adding fuel to fire and will make him more liable to balk at another time. Horses that have balked a few times, turn their heads and look back as soon as they are a little frustrated. This is because they have been whipped and are afraid of what is behind them. When your horse balks, or is a little excited, or if he wants to start quickly, or looks around and don't want to go, there is something wrong, and he needs kind treatment immediately. Caress him kindly, and if he don't understand at once what you want him to do, he will not be so much excited as to jump and break things through fear. As long as you are calm, and can keep down excitement, there are ten chances for him to understand you where there would not be one under harsh treatment, and then the little flare up would not carry with it any unfavorable recollections. Almost every wrong act the horse commits is from mismanagement, fear, or excitement; one harsh word will so excite a nervous horse as to increase his pulse ten beats per minute. Almost any team when first balked will start kindly if you will let them stand five or ten minutes as though there was nothing wrong; then walk some distance in front of them and return, passing around the team, so that they can see you. When you think they have forgotten their excitement, speak to them with a steady voice and turn them a little to the right or left so as to get them in motion before they feel the pinch of the load. Now, if they should fail to start, go to them and gentle them. Spend some time doing this, or until they are composed. To start a team that you are not driving yourself, that has been balked, fooled, and whipped for some time, have the drivers and spectators, if there are any, stand off some distance to one side, so as not to attract the attention of the horse. Unloose their check reins, so that they can get their heads down if they choose; take off the bridle, pat and caress them, and put them back on;

take up their fore feet, adjust their collars, unloose their traces and hook them up again. Now step in front of them, move their ears and put your hand in their mouth and handle their tongue. While thus gentling and composing them, the spectators will think you are doing something that they do not understand, and will not learn the trick. Do not start them until they are thoroughly composed, which can be easily told from the expression of the eye and the movement of the ears. When you have them ready to start, stand before them, and as you seldom have but one balky horse in a team, get as near in front of them as you can. If he is too fast for the other horse, let his nose come against your breast; this will keep him steady, and he will go slow rather than run over you. Turn him gently to the right. Have the wagon standing in a favorable position for starting out, letting them pull on the trace as far as the tongue will let them go. Stop them with a kind word, gentle them a little, and turn them back to the left by the same process. You will have them under your control by this time, and as you turn them again to your right steady them in the collar, and you can take them where you please.

There is a quicker process that will generally start a balky horse, but not so certain as the above method. Stand him a little ahead so that his shoulder will be against the collar. Then take up one of his fore feet and let the driver start them. He will generally go right along. If you want to break a horse from balking that has long been in the habit, put him by the side of some steady horse. Have check lines on them, tie up all traces and straps so there will be nothing to excite them. Do not rein them up, but allow their heads to be loose. Walk them about together as slowly and as lazily as possible. Stop often and go up to the balky horse and gentle him, keeping him as quiet as possible. He will soon learn to start off at the word and stop when you tell him. As soon as he performs right, hitch him to an empty wagon. It will be well to shorten the stay chains be-

hind the steady horse, so that if it be necessary he can take the weight of the wagon off the other horse.

HOW TO MAKE THE HORSE STAND STILL WITHOUT HITCHING.

First, teach him to follow you. When he will do this stand him in the center of the stable. Begin caressing him at the head and gradually work backwards. If he moves, give him a cut with the whip and put him back to the same spot from which he started. If he stands, caress him. Continue this until you can walk about him without making him move. Keep walking around him, increasing your distance and occasionally touch him and caress him. After getting some distance from him, if he should move, give him another cut with the whip and put him back to his place. If he stands, go to him frequently and caress him. Go round him as before. Then stand him in another place and proceed as before.

ON THE TRAINING OF HORSES FOR TROTTING.

The horse should be in good flesh. He should be driven moderately, with walking exercise every morning of about five miles. Before going into quarters, give him a brush, for one hundred yards, at the top of his speed and one or two miles of moderate driving, sufficient to sweat him. Then rub dry with rubbing rags. Light rubbing is the best—just enough to dry the hair. Hard rubbing on the bones or cords causes soreness. Rub the flesh and muscles well to harden them. When driving to sweat, put on two thick, woollen blankets, and drive at full speed two miles. Then turn down the hood or neck cover and scrape the head and neck well and rub dry. Then cover dry and continue the same over the whole body, rubbing lightly and only enough to dry the hair. Then put on nice, dry covering and let him stand. Sweating often in this way will weaken, therefore it should be done but seldom. The food and drink should be of the purest kind; sift the oats free from all dust; also dust the hay

and give about a handful at a feed, morning and noon, and about twice that quantity at night. From twelve to sixteen quarts of oats should be given in a day. Give one gallon of water in the morning, the same at noon; at night give two gallons of water and a peck of oats, with treble the quantity of hay. The horse should not be exercised on a full stomach. Grain lying undigested in the stomach generates a gas by fermentation, and indigestion is the result.

WEIGHTS TO BE CARRIED IN TROTTING.

Every trotting horse starting for a match purse or stake shall carry one hundred and fifty-six pounds. If in harness, the weight of the sulky and harness is not to be considered. Pacing horses are liable to the same rule. It will be interesting to note that, in the regular progressive movements of the horse when trotting, the diagonal limbs act nearly simultaneously, and that the body is entirely without support for varying intervals of time and distance. Until the recent investigation of animal locomotion by Mr. Mybridge, many experienced horsemen were of opinion that during the action of the trot one foot of the horse was always on the ground. Mr. Mybridge, after more than twenty years' study of the subject of animal locomotion, is the recognized authority on this subject, both in America and Europe. He received contributions amounting to seventy thousand dollars to assist him in his work. He produced photographs of the movements of the horse, taken by an automatic electro-photographic apparatus called the zoopraxiscope, invented by himself. The exposures were in some instances less than one five-thousandth part of a second. In trotting at a high rate of speed the fore foot usually precedes its diagonal hind foot in being lifted from and placed upon the ground, and the body will be entirely without support for about one-half the total length of the stride. Beginning the notation with the landing of the right fore foot, the order of the supporting feet will be, first, the right fore foot; second, the left hind and right fore feet; third,

the left hind foot; fourth, without support; fifth, the left fore foot; sixth, the right hind and left fore feet; seventh, the right hind foot; eighth, without support. The time during which one foot alone is on the ground is very brief.

RACK.

The rack is a method of progressive motion by a quadruped in which two lateral feet are, with nearly synchronous movement, placed upon and lifted from the ground, alternating with the other laterals, the body of the animal being in the intervals entirely without support. Sometimes it is called the pace. With some animals the rack is an hereditary movement; with others it is acquired. A trained horse can make faster time by racking than by trotting. The rack differs from the trot in the nearly synchronous action of the laterals, instead of the diagonals.

It is a very easy matter to teach the horse to pace or rack. A strap attached to the stirrup and to the mouth will enable the rider to throw the horse into a pace with the greatest ease. Another good method is as follows: Take nine or ten pounds of lead, divide in four parts equal to three and three-quarter inches by four and a half in size; make two holes in each end of these leads, then fasten two of them together and have them padded. Then fasten them on the horse's legs, one on each hind leg just above the ankle joint. Ride your horse briskly with these weights upon his ankle, at the same time pulling each rein of the bridle alternately. By this means you immediately throw him into a pace. After training in this way to some extent, change the leaden weights to something lighter—leather paddings, or something equivalent. Let him wear these plates until he is perfectly trained. By adopting this plan you may speedily make a smooth and easy pacer of any horse.

AMBLE.

This method of progression is the same as the walk in its foot fallings, except that a hind foot or a fore foot is lifted from the

ground before its fellow hind foot or fellow fore foot, the support of the body developing alternately upon one foot and upon two feet, the single foot being alternately a fore and a hind foot, and the intermedial support alternately diagonals and laterals. The amble is natural to the elephant, and in some countries to the horse, the mule, and the ass. The sequence of foot fallings is the right hind, the right fore, the left hind, the left fore, beginning again with the right hind foot. At no time during the stride is the body of the animal supported. The amble has been erroneously confused with the rack or pace. It is the most gentle and agreeable to the rider of all methods of locomotion of the horse; whereas the rack is the most disagreeable and ungraceful.

WALK.

This method of progression is common to nearly all of the terrestrial vertebrates. The notation begins with the landing of a right hind foot; the consecutive foot fallings will be the right fore foot, the left hind foot, the left fore foot, followed by its diagonal hind, with which the record began. The time intervals of foot fallings vary with different species of animals, but their sequence is invariably the same with all, the apes alone excepted, with which the landing of a hind foot is usually preceded by that of its lateral fore foot. During a single stride of a quadruped in an ordinary walk it is supported in eight different ways—twice upon the laterals, twice upon the diagonals, twice upon two hind feet and one fore foot, and twice upon two fore feet and one hind foot.

GALLOP.

The gallop is the most rapid method of progressive quadrupedal motion, in which the animal springs into the air from a fore foot and lands upon the diagonal hind foot. If the notation of stride by the horse during the gallop begins with a landing with a hind foot upon the ground—as for example, the left hind foot—the right hind will next strike the ground at a considerable

distance forward, then following in succession the left fore and the right fore foot at a distance from each other sometimes equal to the height of the animal. The consecutive foundations of support are—first, the left hind foot; second, both hind feet; third, the right hind foot; fourth, the right hind and the left fore feet; fifth, the left fore foot; sixth, both fore feet; seventh, the right fore foot from which the animal will spring into the air, in which phase (the only one of a gallop when the animal is entirely off the ground) all the legs are flexed under the body. The first foot to strike the ground will be the hind foot diagonal to that from which the spring was effected. This movement, the gallop, has in all ages been employed by artists to convey the impression of great speed, although, curiously enough, the phase in which the horse has been almost invariably depicted is one which is impractible during uniform progressive motion, and conveys no such impression to the careful observer.

CANTER.

In the canter the feet are landed on the ground in the same consecutive order as in the walk, but not with the same comparative intervals of time. Assuming that in the canter the notation is begun after a propulsion through the air with a final thrust of the left fore foot, the landing will take place on the right hind foot, followed in order by the right fore, the left hind, and the left fore from which a succeeding thrust off the ground will be effected. The consecutive supporting feet are—first, the right hind foot; second, the right hind and right fore feet; third, both hind and right fore feet; fourth, the left hind and right fore feet; fifth, the left hind and both fore feet; sixth, the left hind and left fore feet; seventh, the left fore foot alone, from which the animal leaves the ground. The canter is usually regarded as a slow gallop, probably from the facility with which a change from one gait to the other can be effected; an important difference will, however, be observed.

V.

VETERINARY HYGIENE AND DIETETICS.

WATER—QUANTITY, QUALITY.

Water (H_2O) forms about 70 per cent of the whole body. It is one of the chief constituents of the juices and tissues, and is a general solvent, by means of which various materials may be taken in as food, or excreted from the body. The various organs or liquids contain valuable quantities; thus, enamel contains 2 per cent; saliva, 99 5-10 per cent. The water should be pure, and is best when obtained from the clear brook. If soft water cannot be had, draw the hard water from the well and allow it to stand two hours before using. Be careful that there is no drainage of putrid matter into the well or cistern. Many diseases are contracted by allowing the refuse from the barn yards to drain into the cistern, or by watering the animals in the stream below where the drainage enters. During very cold weather the water should be warmed so as not to chill the animal. As a rule, the horse should have one gallon of water in the morning, the same at noon, and two gallons at night. Water should be given frequently while on the road, but only a small quantity at a time, merely cooling his mouth and tongue. Giving a great amount of water diseases the blood and deadens the hair. The water must in some way pass out; it cannot all pass through the kidneys, and it passes off through the pores of the skin, causing the hair to become gummy and making the horse very hard to clean. So great a quantity of water passing off through the pores of the skin causes the hair to look dull and faded. Large draughts of cold water often derange the digestive organs and retard digestion for some time; one gallon of cold ice water will retard digestion two hours, destroy the juices, and disable digestion.

When a horse is very warm he should not be allowed to have cold draughts of water; its rapid cooling of the stomach produces indigestion and colic, frequently causing inflammation of the mucous membrane and the sensitive structures of the feet.

FOOD.

Various tissues of the body, like the parts of a machine, are subject to wear and tear. There is also a constant liberation of energy in muscular work, and the evolution of heat going on in the body. The wear and tear of the various tissues of an active adult horse must be considerable; the brain cells, glandular epithelium, the blood corpuscles, from time to time require renewal and to be supplied with materials. The waste products of the disintegration of the tissues and of the combustion going on in the system are thrown out of the body at the lungs, the skin, and the kidneys. Experience proves that a mixed diet is best to maintain the body in health. Animals will not live on hydrocarbons or carbo-hydrates alone. Too much nitrogenous food causes an excessive amount of urea and uric acid, throwing increased work on the excretory organs.

Milk may be taken as a typical illustration of a natural combination of the various foods. Cows' milk contains:

Nitrogenous matter, casene and albumen	4.1
Butter	3.9
Milk sugar	5.2
Salts	0.8
Water	86.0

Cows' milk equals 14 per cent solids. The normal diet for an adult horse is as follows:

Albuminous matter	28 ounces of avoirdupois.
Fatty matter	21 ounces of avoirdupois.
Carbohydrates	98 ounces of avoirdupois.
Salts	7 ounces of avoirdupois.

Thus about 154 ounces of dry, solid food are contained in this diet, of which about one-fifth is nitrogenous. If we reckon that

50 per cent of ordinary food is water, these 154 ounces will correspond to 308 ounces of ordinary solid food. The standard diet will necessarily be altered under different conditions. Horses need more in cold climates, and when working heavily than when at rest. The hard-working animal requires more food to build up waste tissue.

THE AMOUNT OF NUTRIMENT IN THE VARIOUS FOODS USED FOR HORSES.

The following table will show the amount of nutritive matter contained in the different foods used for the horse:

1,000 parts of Wheat	contains 955 parts of	nutritive material.
1,000 parts of Barley	contains 950 parts of	nutritive material.
1,000 parts of Oats	contains 744 parts of	nutritive material.
1,000 parts of Peas	contains 573 parts of	nutritive material.
1,000 parts of Beans	contains 570 parts of	nutritive material.
1,000 parts of Potatoes	contains 230 parts of	nutritive material.
1,000 parts of Red Beets	contains 148 parts of	nutritive material.
1,000 parts of Parsnips	contains 99 parts of	nutritive material.
1,000 parts of Carrots	contains 98 parts of	nutritive material.

Of the grasses, 1,000 parts of the meadow cattail contains, at the time of seeding, 98 parts of nutritive matter; narrow-leafed meadow grass and seeds and sweet-scented soft grasses in flower, 95 parts; narrow-leaved and flat-stalked meadow grass in flower, fertile meadow grass in seed, and tall rescue in flower, 93; creeping soft grass in flower, 78; common turnips, 42; long-rooted clover, 39; white clovers, 32; and lucerne, 25.

RELATIVE VALUE OF THE VARIOUS GRASSES AND SOILS BEST SUITED TO THEIR GROWTH.

We will here enumerate the various kinds of grasses ordinarily cultivated throughout the United States, specifying the relative value of each for grazing purposes, as also the latitude and soil best suited to them. The famous blue grass of Kentucky, Tennessee, and West Virginia stands at the head of the list for pasturing. It is a small, fine grass, growing about one foot high,

with an abundance of small, bluish colored, narrow leaves at the bottom. It mats the ground thickly with bottom leaves. It is like the down of a carpet, and is the most beautiful grass that grows. It sheds an abundance of seed in the summer and fall, and when it once secures a hold it will overrun the country, carpeting the fields with its soft, green texture. It is very sweet, full of nutrition, and the best grass known for grazing purposes. Its growth is confined to the limestone soil. It is cultivated with great difficulty on any other soil. North of latitude 40 or south of 35 it does not flourish well.

Clover is next on the list. We have the white and the red clover. The white clover grows about six inches high, with small leaves and white blossoms. It is used for grazing purposes generally, as it is too small to cut. The red clover is much larger and grows three feet tall in good soil. There is an objection to both clovers when used for grazing. They act upon the salivary glands and cause a flow of saliva from the mouth, producing that debilitating affection known as slobbering. When wet with dew it causes tympanites or hoven in the cow. When used for hay it contains a dust that is very detrimental to the respiratory organs of the horse. It is a good food, however, for the cow.

Timothy is the next in the list. It is not a valuable grass for grazing purposes, but makes the best hay of all the perennials. It grows about five feet tall in good soil and is cut down and cured while in bloom. It grows in all latitudes north of 35 degrees, flourishing best on rich, dry upland, and upon all soils about equally, except the sandy.

The grasses we have enumerated here are perennials, living two years in most soils. They drop their seeds in the fall season and lie on the ground until spring, when they come up, very small at first; continuing to grow, they become the fine, tender grass of the fall pasture. The roots of these shoot up and make the pasture of spring.

The annuals coming earlier are the millet, Hungarian, and rescue grasses. The perennial grasses do not thrive below the

latitude of 35, or the southern border of Tennessee. None of the clovers succeed in the cotton States. The only grass that grows profusely in the cotton States is the herd grass.

Pasture is the horse's natural food; the air his natural stable and home. Diseases, except from accident, are seldom found in the pastures. The horse is never so healthy and happy as when roaming through the fresh meadows and deep green valleys. Instead of the dusty walls of a stable, he is surrounded by nature's own amphitheatres. His bed among the ammoniacal vapors of the stable is changed to one of perfume and flowery beauty. The stable horse should have a run at pasture for at least two months in each year. He here finds a specific for the ills of stable confinement. It renews and purifies his blood, opens the capillaries, sends out the oily fluids to the surface, regulates digestion, relieves constipation, loosens the joints, transforming the jaded horse into a healthy one, with glossy coat and nimble limbs. The horse domesticated is a slave; the stable is his prison. He often manifests his desire to be in the open air by neighing while in the stable and by playing and capering about when loosed from his prison. He grabs at every spear of grass within his reach, and thus demonstrates his desire for his natural food. A horse must be taught to eat the prepared foods. He does not relish it except by an appetite depraved by long habit. Even when pure, a great deal of the prepared food is not healthy. If a horse be allowed a run at pasture for two months in a year, the damage done by stabling may be repaired.

HAY AND FODDER.

Timothy when properly cured is the best grass for hay. It possesses more nutriment and retains it better through the process of curing than other grasses. It should be harvested at maturity while yet in bloom. It should be put in the barn while free from rain. It is as necessary to have shelter for the hay as it is for the horse. Good, ripe timothy loses only about one-fifth of its weight in curing; herd grass, two-fifths; white clover,

one-half; and red clover, about three-fifths. In substance they vary about the same, and as to healthfulness they are to be estimated in the same order, timothy being at the head. The herd grass may be placed next to timothy in substance. It does not grow well on uplands or heavy lands. It grows best in low, damp lands, and is extensively cultivated throughout the Cotton States. We have frequently seen fine fields of this grass in the Cotton States, and always confined to low, damp lands.

Some of the annuals make a good hay. The rescue grass ranks first in value; the Hungarian, second; millet, third. Millet fed with its seed makes a tolerably good food. It is extensively grown throughout the Southern States. Another annual extensively used is the corn fodder, obtained by pulling the blades from the stalk, and, when dry, binding them in bundles and storing away for winter use. This process of curing is generally used in the Southern States. In many parts of the country the stalks are cut with the blades left on, put on shocks to dry, and then stored away for winter food. Corn fodder is not so healthy a food as some others, and in the Southern States, where it is extensively used, many diseases are contracted by its constant use. It appears to dry up the blood, and from its dryness and brittleness it is apt to harm the throat. The writer has traced encephalitis or inflammation of the brain to the continued use of damaged fodder.

The different straws are wheat, rye, oats, and barley. They possess a limited amount of substance, about one-twentieth as much as good timothy hay. They are of but little value to the horse, and should only be used in making chop feed. They are too dry when used in any other way. It is best to feed dry hay moistened with water, and add the chop to it. This makes the dry feed soft, and the horse will keep fat on much less food than by any other mode. Most of the hay allowed between meals should be cut and rolled in chop. If the owner would consider the improved condition of his horses and the cheapness of this method, the trouble of cutting the feed would not be objected to.

It is of the greatest importance that the hay be properly cured; damaged by rain, it is very injurious to the animal's health. We often trace diseases of the urinary organs to mouldy and mow-burnt hay.

GRAIN.

The horse must receive a portion of grain; as a general rule, one-half the food given him should be of this character. The horse at rest requires less feed, and he requires less grain in warm than in cold climates. When the horse is worked and undergoing long-continued muscular exertion, he requires more feed than when standing idle. There is greater difference in the quality and value of the different grains than in the various grasses. Corn and oats are more extensively used in this country than other grains. This is due, perhaps, to some extent to their convenience, they being much less trouble than other foods. Oats, as part of the food, is the best for the horse. Corn alone is objectionable. It is heating to the blood and harder to digest. The oats may be fed unbroken, but are much better when ground. Oats unground are often not thorough masticated, and hence pass the stomach not thoroughly digested. Corn, when used alone, is very objectionable—the fruitful source of many diseases in the horse. Many a young animal has been ruined by feeding exclusively upon corn. It not only shows its bad effects in acute diseases of the digestive organs known as colic and acute indigestion, but in various cutaneous diseases and inflammation as a result. Many horses' teeth are so neglected that they cannot sufficiently masticate the grain. The whole food is taken into the stomach unmasticated; it heats and ferments, and then follow the evil consequences of colic. But few young horses fed on corn escape indigestion. When corn is used, it should only be in part. Bran fed with corn makes it safer. The horse should have a good bran mash at least twice a week. Rye and barley mixed make an excellent chop feed. Carrots, turnips, beets, pumpkins, potatoes, cabbage, apples, and similar green feeds are good during winter while living on dry foods.

THE STABLE.

No division of our subject is of more importance than this. The evils resulting from badly located and ventilated stables are simply immense. The horse is debilitated to such an extent that it predisposes him to all the ills to which his flesh is heir. The farmers' stables are not so much in fault as those of the towns and cities. The cities are at disadvantage in getting pure air and light. Many a horse's home is located in some back alley or lane, in a low, damp, dark situation, where there is but little room, and where great piles of manure are suffered to accumulate, filling the atmosphere with fumes. The location of the stable is of great importance. If possible it should be on an elevation where there can be drainage. If in the city, it should be so situated that surrounding buildings will not obstruct the air. The stable should be located in dry soil. Low, level, damp surroundings and marshy localities not only breed fevers and malaria, but are prolific causes of colds, coughs, and lung troubles. Do not locate the stable where the natural current of air or high winds will be likely to bring the poison of decayed vegetable matter from low lands. Certain brooks, boggy lands, ponds, foggy localities, too much shade, all conduce to the development of disease. The stable should not be shaded by too much foliage. The dampness of the leaves attracts malaria. Shade trees at a little distance, however, are beneficial. In cities where stables are located in damp places the horses on the second floor will not be attacked with colds and fevers, while those on the ground floor will become affected. This is proof that malaria seeks the surface of the earth. Stables located where marshes or running streams have recently been filled in are hovels for disease. Dry earth destroys the germs of disease; it is a great absorbent and deodorizer, and should therefore be selected as a site for a stable. Each horse's apartment should be large enough for him to turn around or lie down comfortably.

Ventilation is of the greatest importance in a stable. In cities

we frequently see as many as a hundred horses shut up in narrow and close stables, with no openings for foul air to escape. Each pair of lungs throws off an immense amount of carbonic acid gas during the night. The air becomes so greatly surcharged as to be absolutely poisonous. Ordinary atmospheric air contains nearly 2,100 parts of oxygen and 7,900 of nitrogen, and about three parts of carbonic acid in 10,000 parts; expired air contains about 470 parts of carbonic acid, and only about 1,500 parts oxygen, with little or no change in the nitrogen. Hence one can readily see that confined air may soon become absolutely poisonous. The ventilation may be accomplished by proper ventilators. The ventilators should be arranged on opposite sides of the building to insure an abundant supply of air. The ventilators and windows should be placed higher than the animals' heads. The flooring and sides of the building should be made air tight. The box stalls should be air tight to the height of four or five feet. The stable should be kept at a temperature of about ten or twelve degrees above the temperature out of doors. During the heated period slat doors should be used and all fresh air possible allowed to come into the stables. Electric fans are of great benefit in crowded city stables.

If the temperature of the stables be regulated by a thermometer, and the ventilation sufficient to keep the air pure, sore throats, fevers, inflamed lungs and eyes, and swollen legs will be prevented. The majority of the maladies of the horse, and those of the most fatal character, are directly or indirectly caused by a deficient supply of air. The manure from the stables should be carted away each day. If there is a drainage away from the stables, the manure may be allowed to remain for several days, but should never be allowed to remain inside the stable for a day. The floor should be of dirt or gravel. The plank or paved floor is not objectionable when sawdust is used. The feet of horses standing on plank or hard floors become hard and brittle. The floor should be entirely level.

LIGHT.

Light is essential to the growth and development of every object in the world. Our stables, therefore, should be well lighted and made as pleasant as possible. Light is especially necessary for the young animal. If kept in dark stables their eyesight will be injured, and they will become diseased. No special directions can be laid down regarding the lighting of stables, nor can special directions be given for ventilation. The owner must exercise his own judgment.

BEDDING AND CLOTHING.

Straw makes as good a bed as anything. It should be kept perfectly clean, the manure and the urine being removed every morning. Where floor and concrete stalls are used, the horse should have a bed to stand on as well as to lie down on. About three inches of damp sawdust makes a good bed to stand on. Clothing for the horse is highly necessary. No better investment can be made than the purchase of a good, thick, and substantial blanket for use during cold and stormy weather. Exposure to beating rain and cold atmosphere, without protection, is very detrimental to the animal's health. The horse, even when the weather is not very cold, if driven hard and perspiration is produced, if allowed to stand in the wind, will take cold. The horse owner should be especially careful in the spring months. The first warm days are forerunners of pneumonia and fevers, caused by the temperature being suddenly checked by the cool atmosphere of the spring months.

The blanket should be employed when the blood has become unusually heated by severe exercise, or when he is suddenly changed from one extreme temperature into another, and when enfeebled by disease. If a blanket is used in the stable, it should be light in weight. Where stables are so arranged that a uniform temperature can be maintained, blankets should not be used.

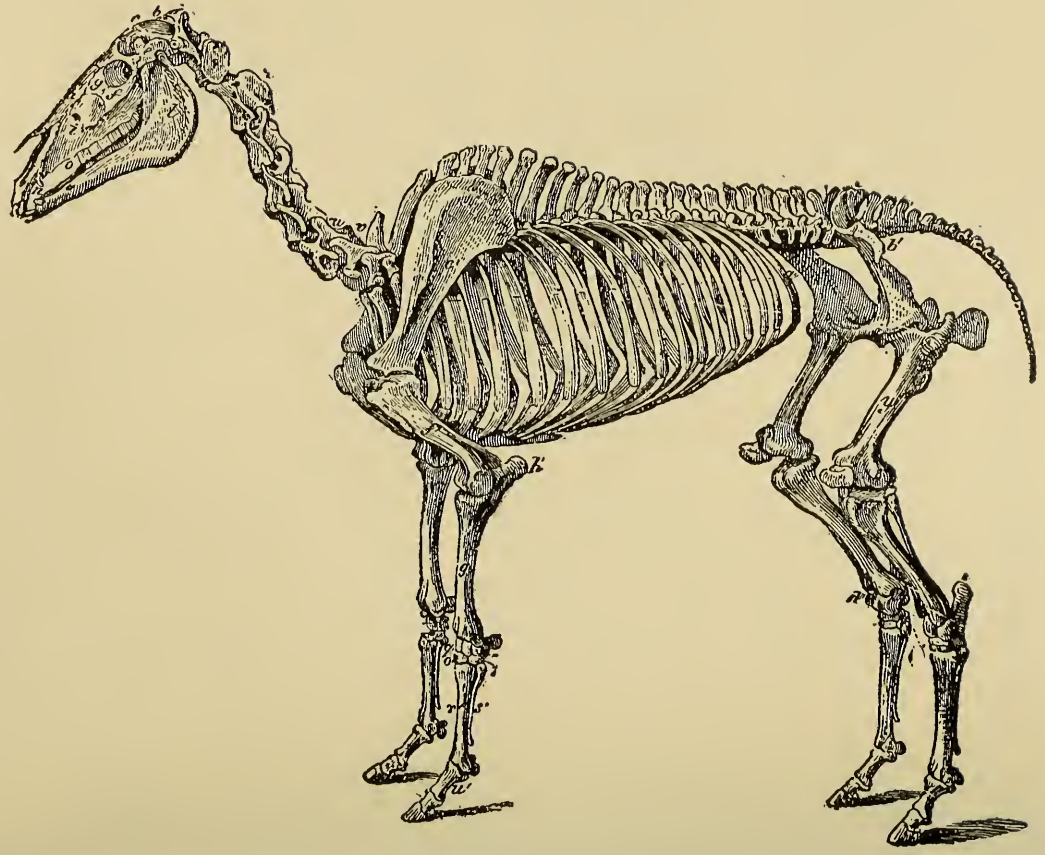
VI.

STRUCTURE OF THE HORSE.

Our limits allow, and our purpose requires, but a short discussion of the horse's structure. It is our object to communicate a general knowledge of his structure, so that in the treatment of disease the part affected may be readily known and the remedy intelligently administered.

Our first division will be the internal framework on which the body is built, the endo-skeleton. This internal framework, supporting the soft tissues of the body, forms various cavities for the location of important organs, as the brain, spinal cord, eyes, heart, and lungs, and act as levers for the action of the muscles and joints to aid in the locomotion of the body.

In describing the framework, we present the engraving of a perfect skeleton, accurately indexed for reference. This will enable the reader to locate the various bones of the body and to learn their proper names. It will also aid in shortening our description of the bones. Anatomists differ as to the number of bones composing the skeleton, some enumerating all ossific bodies, including the teeth and sesamoids, which others eliminate; some, again, regard certain cranial bones as single, other authorities as double. It is of little practical importance what view is taken; it will be found that there are about 216 separate bones, or, including the teeth, 256 pieces in the skeleton of the horse. In our description, we take the anterior limb first, beginning superiorly and ending inferiorly. First in order is the scapula, a flat bone situated on the antero-lateral surface of the thorax, with its long axis sloping downwards and forwards to articulate with a somewhat twisted-looking bone, the humerus. The humerus extends from the scapula to the radius in an oblique direction, downwards and backwards. The radius occupies a



(86) Fig. 1.

vertical position between the humerus and carpus. This bone is frequently called the arm. It is the longest bone of the fore leg. On the supero-posterior part of this bone is a triangular bone, the ulna. Next in order is the carpus, or knee, composed of seven and often of eight small, irregular bones, arranged in two rows of three each, one above the other, the seventh being at the back of the three in the upper row, and the eighth, when present, in a similar position with respect to the lower row. Naming from within outwards, the bones of the upper row are the scaphoid, luner, and cuneiform, and the trapezium behind the latter; those of the lower row are the trapezoid, os magnum, and unciform, and the pisiform behind the trapezoid. The next are the large and two small metacarpals, corresponding to the bone that lies between the wrist and finger of the human. Below this is the phalanges, consisting of three bones, which are homologous to the three phalanges of the human finger, and having two sesamoid bones placed behind. In descending the os suffraginis comes first, os coronæ second, and lastly the os pedis. The navicular, or shuttle bone, is situated, with its long axis transversely, behind and below the os coronæ and behind the os pedis, with both of which it articulates. The posterior extremity is united to the trunk by the direct articulation of the pelvic arch with the femur and sacral vertebra. The entire arch is called the os innominatum, or pelvis. The os innominatum is divided into three parts—the ilium, ischium, and pubis. The first bone of the hind extremity is the femur, or thigh bone. It is the largest, thickest, and strongest bone in the body. The patella, the knee pan, or stifle bone, is placed in front of the trochlea of the femur. The tibia, or shin bone, is situated between the femur and astragalus, slanting downwards and backwards. The fibula is a little, long slender bone, attached to the outer side of the tibia. The tarsus, or hock, corresponds to the ankle joint of man, and is composed of six bones arranged in two series—one consisting of the cuboid and three cuneiform bones, the magnum, medium, and parvum. The other, the upper series, consists of

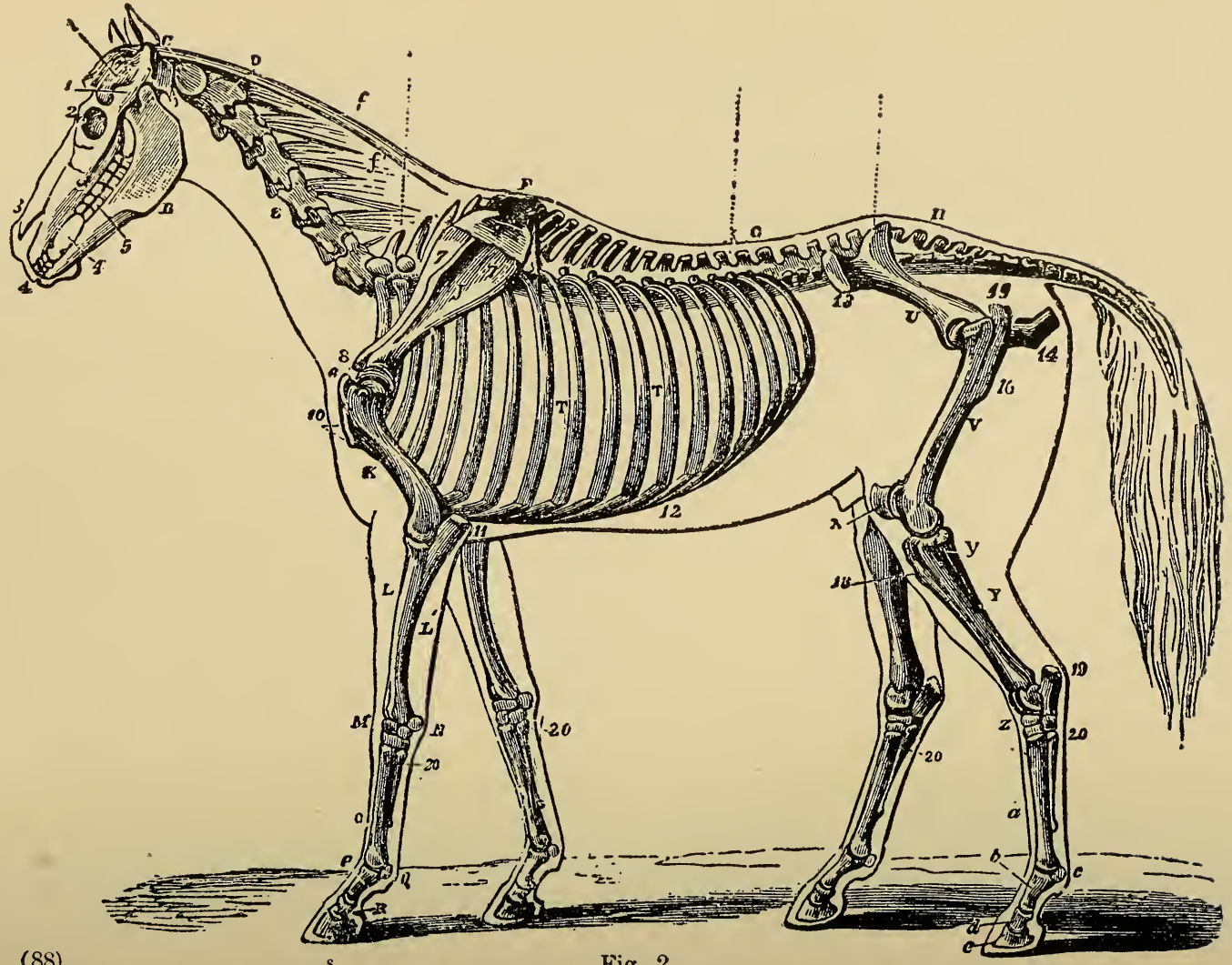


Fig. 2.

EXPLANATION OF FIGURE 2.

Skeleton of the Horse,

Showing its relation to the contour of the animal, viewed laterally.

A. Temporal fossa.
B. Inferior maxilla.
C. Atlas.
D. Dentata.
E. Cervical vertebræ.
F. Dorsal do.
G. Lumbar do.
H. Sacral do.
I. Coccygeal do.
J. Scapula.
K. Humerus.
L. Radius.
L′. Ulna.
M. Carpus.
N. Trapezium.
O. Metacarpus.
P, *b*. Os suffraginis.
Q, *c*. Sesamoids.
R, *d*. Os coronæ.
S, *e*. Os pedis.
T T. Ribs.
U. Ilium.
V. Femur.
X. Patella.
Y. Tibia.
y. Fibula.
Z. Tarsus.
a. Metatarsus.
f. Ligamentum nuchæ, funicular portion. *f′*. Lamellar portion.
1. Zygoma.
2. Orbital fossa.
3. Nasal peak.
4. Incisor teeth.
4′. Canine teeth.
5. Molar teeth.
6. External humeral trochanter.
7 7. Scapular fossæ.
8. Coracoid apophysis.
9. Cartilage of prolongation.
10. Deltoid ridge, and external tuberosity.
11. Olecranon.
12. Costal cartilages.
13. Anterior iliac spine.
14. Ischium.
15. Trochanter major.
16. Trochanter minor.
18. Anterior tibial tuberosity.
19. Calcaneum.
20 20. Small metacarpal and metatarsal, or splint bones.

the astragalus and calcaneum. The other bones of the hind extremity are similar to those described below the knee of the fore extremity.

Next may be mentioned the bones of the head. The most noteworthy of these are the superior and inferior maxillaries, the upper and lower jawbones. In these are set the teeth, twenty-four molars, or grinders—six on each side, both above and below; twelve incisors, or front teeth—six above and six below, and four canine teeth, or tushes—one on each side, above and below. Excluding the teeth and the internal bones of the ear, there are thirty-eight bones in the skull—six single ones, the rest in pairs. There are winding cavities in the bones of the face called sinuses. They communicate freely with each other and with the nasal fossæ, of which they may be regarded as prolongations. They number four on each side—viz., the frontal, the maxillary, the sphenoidal, and the ethnoidal. The head articulates with the first cervical vertebra, from which it is suspended by its posterior extremity, its anterior extremity being free.

Here begins the line of the vertebræ; extending the whole length of the body, it consists of a series of single bones, termed vertebræ, firmly united and presenting horizontally a succession of curves; thus in the horse the neck, back, and croup are usually curved, while the loins are nearly straight. The vertebral chain is usually divided into five regions, exclusive of the cranial portion. These are the cervical, dorsal, lumbar, sacral, and coccygeal, respectively the regions of the neck, back, loins, croup, and tail. The bones of these regions are seven cervical; eighteen dorsal, corresponding in number with the pairs of ribs; five or six lumbar; five sacral, and the coccygeal, varying from thirteen to twenty. The dorsal vertebræ superiorily, the ribs and their cartilages laterally, and the sternum or breast bone inferiorly, form the cavity called the thorax. In the horse the ribs usually number eighteen, eight of these being true ribs and attached to the sternum; the ten posterior ribs, having only an indirect

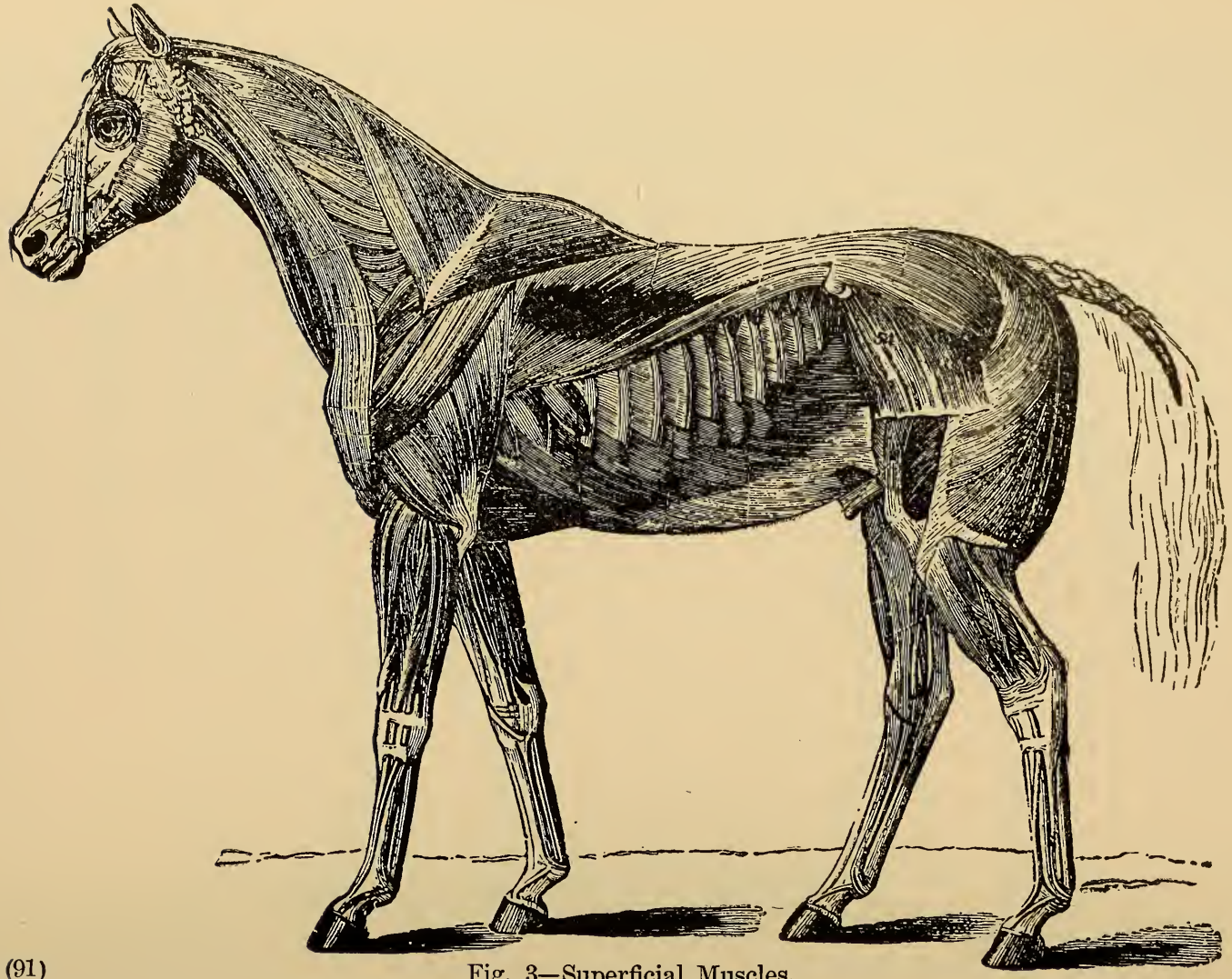


Fig. 3—Superficial Muscles.

sternal attachment, are known as false ribs. The sternum is constructed of seven bones, united by cartilage in the young animal and by partial ossification in the adult.

MUSCLES AND TENDONS.

The muscles are the active organs of motion, or of locomotion. They contain a specific contractile substance termed muscular tissue, together with areolar and fibrous tissue, and a certain amount of fatty material; they are also furnished with nerves, blood vessels, and absorbents. They constitute the chief bulk of the soft parts outside the three great cavities of the body—the cranial, thoracic, and abdominal. They are composed of numerous little strings or contractile fibers, which are either collected into bundles connected at their extremities, or they help to form the walls of the hollow viscera; for example, the bladder, stomach, etc. The muscles are very extensile—*i. e.*, capable of being extended or stretched; when one set of muscles contract the opposing muscles are extended. They possess very little elasticity, but that little is very perfect, as they return rapidly and perfectly to their original length. The muscles of the body are always in a state of extension—*i. e.*, always slightly stretched. When a stimulus is applied to the muscle it responds by contracting. This contractibility is the characteristic property of muscle. One form of muscular tissue is known as striated or voluntary, the contractions and relaxations being controlled by the will of the animal. In another varietv the non-striated or involuntary action is beyond the control of the will. The muscles grow and become firmer in substance from exercise. If, however, the exercise be excessive, after growing to a certain extent, they will waste. We have atrophy from disuse and atrophy from overuse. Fattening the animal does not increase his muscles or his strength; nothing but the adipose or fatty matter is increased. This gives the parts a full and rounded appearance, so much admired in the horse, and also covers up many serious defects. The accumulation of fat, when excessive,

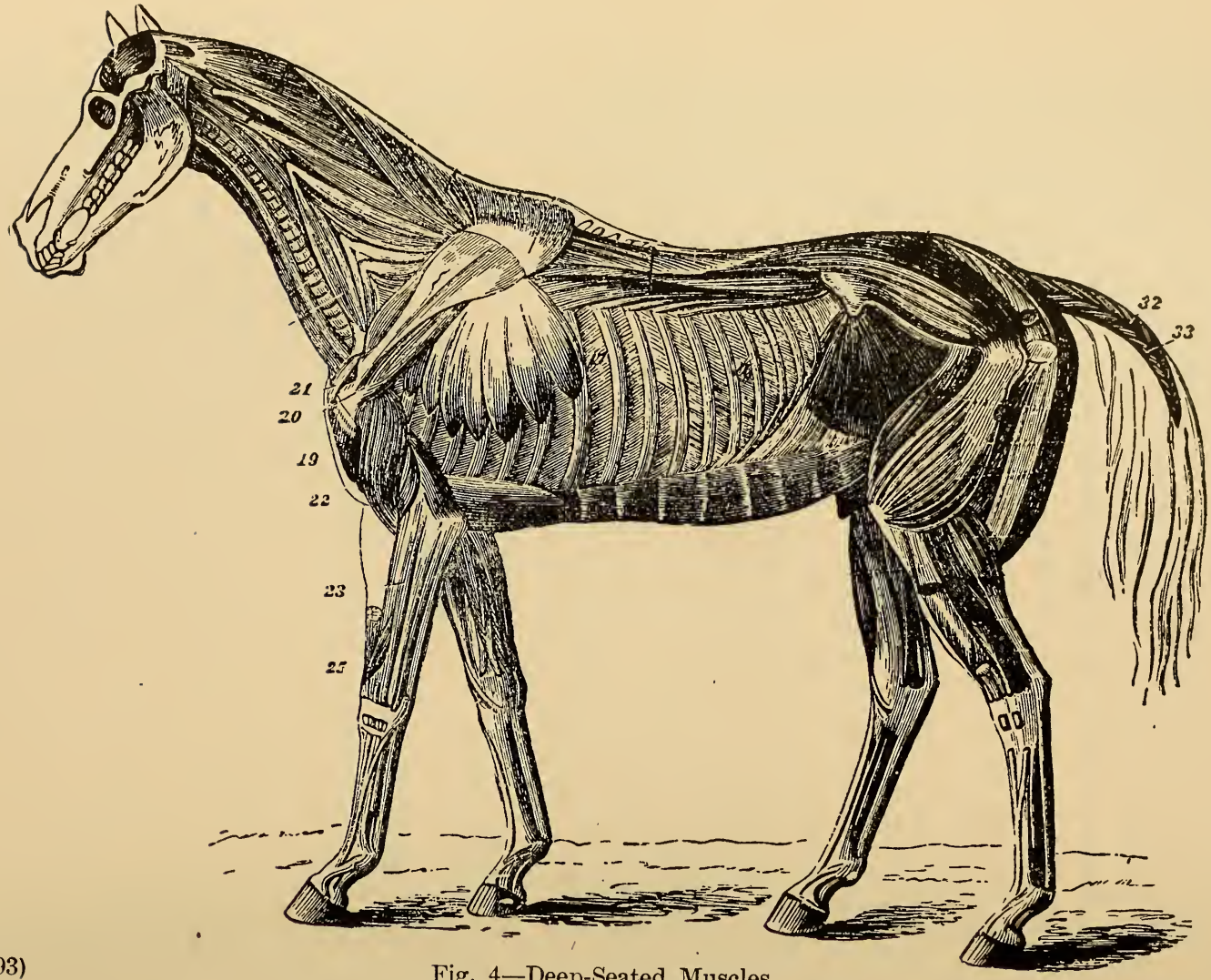


Fig. 4—Deep-Seated Muscles.

becomes an obstruction to muscular action. It has, however, a happy effect upon the skin and hair. Oozing out at the pores, it oils the entire surface of the skin, which is thus kept soft and pliant, making the hair smooth and glossy. The tendons are structures resembling ligaments in their composition, being formed of white fibrous tissue mixed with yellow. They form the termination and attachment of muscles to the bones, are practically non-elastic, and serve an important purpose in the animal economy.

It is not our design in this work to even classify the muscles or to name them. The reader may obtain a knowledge of their location by referring to the plate, which shows the superficial muscles of the body and their names.

MEMBRANES.

The muscles are bound down by strong membranous expansions of white fibrous tissue called fascia, which is firmly connected with the bone, and known as the superficial and deep fascia. The superficial fascia, varying in thickness in different regions of the body, separates the muscles from the skin. Its chief use is to protect the various structures in contact and to conserve the animal heat, fat being a bad conductor. The aponeurotic or deep fascia encloses the body of each muscle in a sheath, and becomes united to and blended with the periosteum. This fascia is very strong, and prevents displacement of the muscles during severe exertion.

Under this head we will consider, briefly, the membrane which lines the four great systems of the body—the digestive, respiratory, urinary, and genital systems—from all of which are apertures on the surface of the body. These cavities are lined by mucous membrane and provided with various glands and other necessary organs, becoming continuous with the skin at each of their orifices. While it lines the four great systems, the character of the membrane changes with the different organs. In some it is smooth; in other organs it is rough or in folds, and supplied

with villi or papillæ. The membrane of one system becomes continuous with that of another; for an illustration, the membrane which lines the digestive canal becomes continuous with that lining the respiratory canal. In a similar manner the mucous membrane of the urinary canal becomes continuous with that of the genital canal in the vagina in the female, in the urethra in the male; the membrane becomes continuous with the skin at the orifice of these organs. The closed cavities of the body are lined by serous membranes. The following are the serous membranes and their position in the body: The peritoneum lines the abdominal cavity; the pleura covers the lungs and lines the thoracic cavity; the pericardium, that contains and supports the heart; the endocardium, which is continued through the veins and arteries, lymphatics, etc.

THE SKIN AND ITS APPENDAGES.

The skin and its appendages form the external casing of the body. The skin consists of two parts—the epidermis or cuticle, superficially placed, and the dermis, corium or cutis vera, which forms the deep layer. Its chief appendages are glands and the epithelial modifications, hair, horn, and hoof. The epidermis forms a protective covering over the whole surface of the body. It varies in thickness in different parts, being especially thick wherever the skin is exposed to friction. It is moulded over the surface of the corium, covering the ridges, depressions, and papillæ. It is made up of three principal layers—the horny layer, or *stratum corneum*, is the most superficial, and consists of layers of flattened cells, which are dry and horny, without any nucleus; the *stratum lucidum*, composed of several layers of nucleated cells, which are more or less indistinct and in section appear as an almost homogeneous layer; the *rete mucosum* or malpighian layer consists, in its upper part, of layers of prickle cells, and its inferior layer consists of a single stratum of columnar cells. In these cells the pigment exists which gives color to the skin. The cuticle is itself insensible, but one of its

most important functions is to protect the parts beneath. There is at all times a change taking place in the outer covering of the animal—a constant alteration and renewal of every part of it. The scarf skin is constantly throwing off dry scales. In producing a blister, the scarf skin is raised from the skin beneath and thrown off, and in mange it is thrown off in dry, hard scales.

The dermis or true skin lies beneath the rete mucosum. It is made up of an interlacing network of connective tissues, formed of white fibrous tissue, yellow elastic tissue, corpuscles, vessels and nerves. It is very vascular and highly sensitive, being the seat of touch. It is attached to the underlying parts by a layer of areolar tissue, which usually contains fat. The dermis consists of fibro-areolar tissue and vessels of supply; it is divided into two layers—the deep and true corium and the upper and papilliary. The skin everywhere clothes the external surface of the body, protecting the underlying parts from injury. It affords support and protection to the termination of the sensory nerves, which render it an important sense organ. It is a bad conductor of heat, and thus serves to preserve the heat of the body. It is supplied with a large extent of capillary blood vessels, and thus, by its means, a large surface of blood is exposed to the cooling influence of the air. The dilation or contraction of the blood vessels supplying the skin helps to regulate the heat of the body. The sweat glands, which it contains, make it an important excretory organ. It plays a subsidiary part as an organ of respiration. Under exceptional circumstances, absorption takes place from its surface. The sebaceous glands lodged in the corium are most abundant in parts exposed to friction. They generally open into the hair follicles, and occasionally on the surface of the skin. The sudoriferous or sweat glands are situated in the subcutaneous areolar tissue, surrounded by a quantity of fat. They are small, round, reddish bodies, each of which consists of one or more fine tubes coiled into a ball, the free end of the tube being continued up through the true skin and cuticle and opening on the surface by a funnel-shaped orifice.

The hair is the clothing of the horse, and is a modification of the epidermis. The hair consists of a shaft and a root. The shaft of the hair is cylindrical and covered with a layer of scales, arranged with their edges upwards. The substance of the hair consists of fibers, in which nuclei may be discovered. There are also present in some hairs small air spaces. In the coarse hair there is the medulla, which is occupied by small, angular cells and fat granules. The root of the hair swells out into a knob, and fits into a recess in the skin, called a hair follicle. The follicle consists of two coats—an outer or dermic coat, continuous with the corium, and an inner, continuous with the epidermis and called the root sheath.

The condition of the horse's health is shown by his hair. If debilitated or diseased, his coat will be dry, harsh, and standing. When in health, his coat will be soft and sleek, presenting a yielding softness and elasticity. The fatty matter from the sebaceous glands softens and oils the hair, causing it to lie in its proper direction, and giving it a smooth and glossy appearance. We can also judge the horse's breeding by his coat. The common-bred horse has a long, shaggy coat. The coat of the well-bred horse is short, of a finer texture, and more downy in its character. When we see a horse clipped, we know that he is of common blood. We condemn the practice of clipping. Nature has provided different suits for the horse in different seasons. In the spring the old coat of thick, coarse hair comes off, and a new one, a half or quarter of an inch in length, is ready to take its place. The old coat, as the weather grows warmer, is gradually replaced by the new. Part of the new coat is shed as the warm summer days approach. As the season again changes and the cold increases, a new suit of hair begins to show itself, much thicker and coarser. This is in addition to the finer summer coat, with which it forms an excellent clothing for winter. The suit which the horse will need in the fall begins to grow in the spring, and that for the spring in the fall. We should not tamper with nature by clipping.

FOOT.

In equine anatomy the word "foot" implies the hoof, together with the bones and soft structures contained therein. The foot is of the greatest practical importance, owing to the many diseases and injuries to which it is liable. The protective portion, or wall of the foot, closely resembles the epidermis. It is, in fact, a modification of that structure, consisting of hard and thin layers of cells on the surface and round, moist cells beneath. The highly sensitive secreting portion is also a modification of the skin. The hoof of the horse corresponds to the finger-nail of man, but is developed over the sides, forming a protective, horny case, enveloping the inferior extremity of the digit. The wall is that part visible when the hoof rests on the ground; the sole forms the inferior portion of the hoof; and, lastly, the frog is the interior horny substance.

In speaking of the wall, we designate its different parts, as the toe, quarters, heels, and bars. The toe forms the front of the hoof, and is the deepest and thickest part of the wall, which gradually declines in height as it passes backwards to form the quarters; these occupy the space between the toe and heels. The wall decreases in thickness from the front, being not more than one-third as thick on the sides. At the back or posterior part of the foot the wall takes on each side a sudden bend, forming an acute angle, and is continued inwards to the center of the foot, where the two parts unite with the sole. The angles of the inflections are called the heels, the inflections themselves the bars, the latter forming stays to the quarters. The external surface of the wall is, in a state of nature, covered by a kind of epithelial varnish, termed the *periople*, which is thickest at the top of the wall, just under the hair. This, which is a natural varnish provided to check evaporation and consequent cracking of the subjacent horn, is generally rasped away by the shoeing smith. The internal surface of the wall is traversed in a vertical direction by the series of horny laminæ, numbering about five or six hun-

dred. The superior or corinary border of the wall shows a gutter, termed the *cutigeral groove*, which is the mould left by the coronary cushion. The inferior border embraces the sole, and in the unshod animal comes into contact with the ground.

The sole is a thick plate of horn, which helps to form the inferior portion of the hoof. It is comprised between the inner border of the inferior part of the wall and the inflection of the bars. The inferior or external surface forms a vault, which is more or less concave in different animals. The superior face is somewhat convex, and has a punctuated appearance, similar to that already seen in the cutigeral groove. The minute holes lodge the papillæ of the so-called sensitive sole, which is the horn-secreting structure of this region. Anteriorly the sole presents a convex border, which unites it intimately to the lower border of the wall, a line of whitish horn marking the junction of the two structures. Posteriorly, it has a deep V-shaped indentation, into the central point of which the frog penetrates.

The frog is an elastic mass of horn, which in a state of nature projects sufficiently to come in contact with the ground, and thus give the animal a secure foothold. Its inferior surface shows posteriorly a shallow cleft, or depression, termed the *median lacuna*. The superior surface shows a projection termed the frog-stay. On each side of the frog-stay this surface is depressed, and the whole is moulded on the plantar cushion. The base or posterior extremities constitute the heels or bulbs of the frog; these are two round, flexible, and elastic eminences formed by two extremities, and separated by the cleft. The anterior extremity, or point, is wedged into the center of the sole. The lateral borders bring the frog into relation with the bars and the sole, and there is an intimate union with each of these at the point of contact. The parts contained within the hoof are the os pedis, os navicular, the distal extremity of the os coronæ, the ligaments by which these are connected together, the insertion of the extensor pedis and flexor perforans tendon and the vessels and nerves. There are also certain structures proper to the

L. of C.

foot—viz., the lateral cartilages, sensitive frog, coronary ligament, sensitive lamina, and sensitive sole.

The lateral cartilages are two thin plates, composed of hyaline cartilage in the middle, partaking more of the nature of fibro-cartilage towards the borders. They are of an irregular quadrangular form, and surmount the wings of the coffin bone. The sensitive portion of the foot is attached to the inner surface of the hoof. The sensitive frog occupies the posterior and central parts of the foot, filling up the irregular space between the lateral cartilage, flexor tendons, and os pedis. The coronary substance, or coronary band, is that vascular structure which occupies the cutigeral groove on the superior border of the wall. The sensitive laminæ are the continuations of the coronary substance, and are attached to the coffin bone by a dense, fibrous membrane. The sensitive sole, continuous with the sensitive laminæ and frog, is firmly attached to the coffin bone; like the sensitive laminæ, it is made up of a fibro-vascular membrane, clothed by a continuation of the corum, covered by villi, which secrete the horny sole. The perioplic ring is composed of papillæ like those of the coronary cushion, but smaller in size, and it is by its agency that the periople which covers the exterior of the wall is formed.

THE BLOOD.

The blood, as it exists in the living body, is a red, homogeneous, alkaline fluid, of saltish taste and faint odor; its specific gravity is 1052-1058. It consists of minute, solid bodies, the corpuscles floating in a liquid, the liquor sanguinis. The corpuscles are of two kinds—the red and the white, or colorless; the former, by far the more numerous, exist in varying proportions. The red corpuscles are circular biconcave discs of 1.4000th part of an inch in diameter, their average thickness being about one-fourth of this.

The white corpuscles are larger than the red, spheroidal in shape. Some of them are smaller than the red, and have a lower specific gravity. They possess one or two nuclei, which are

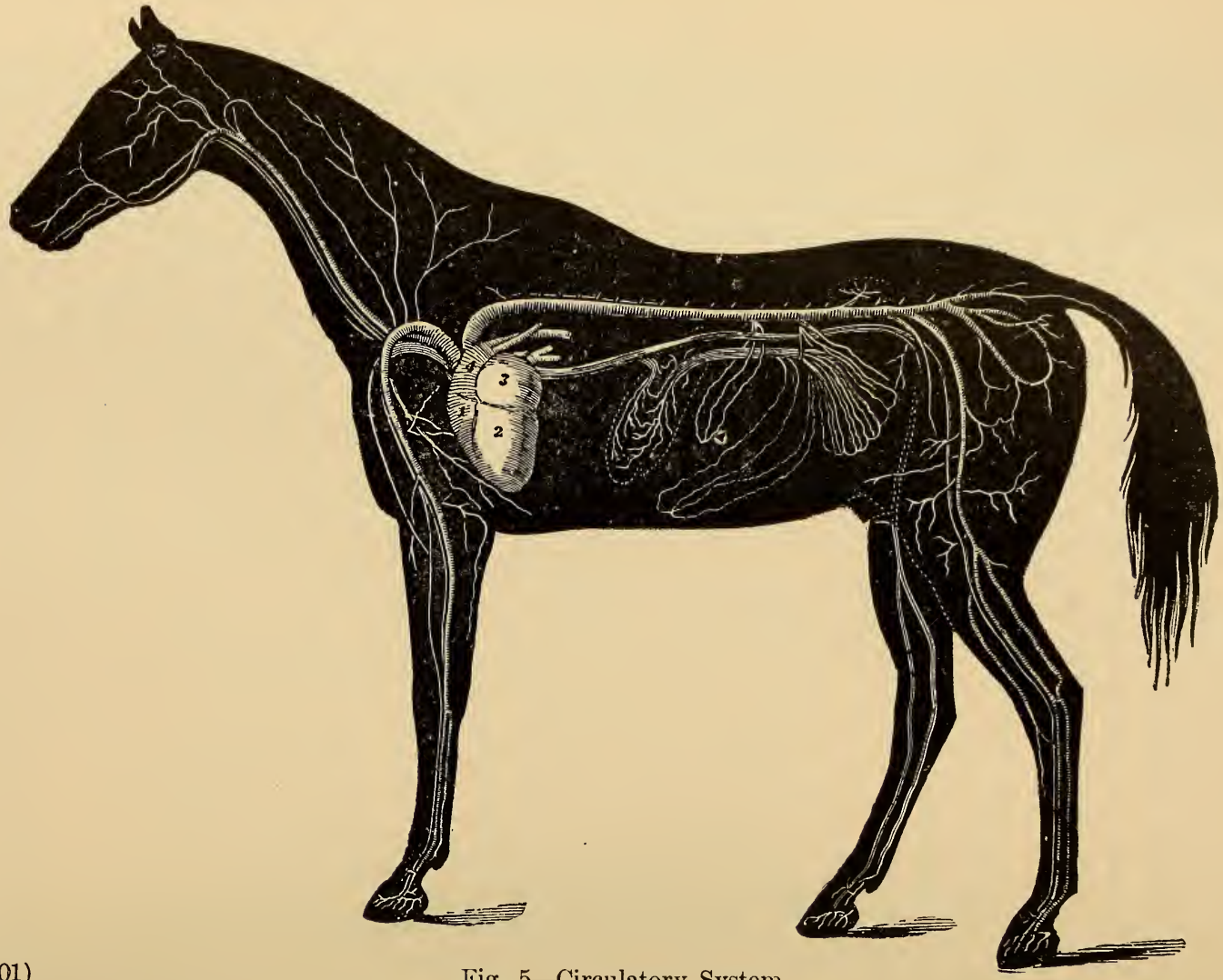


Fig. 5—Circulatory System.

readily brought out by acetic acid. The white corpuscles are present in the blood in the proportion of 1 per 300 red corpuscles after a meal and 1 per 800 during fasting; they are much more numerous in some diseases, as in leucocythæmia.

The liquor sanguinis is a clear, yellow, alkaline fluid, in which the corpuscles float. It is pale and clear, and consists of water, fibrin, albumen, fatty compounds, extracts, odoriferous, and saline matters. It may be obtained by allowing the slowly coagulable blood of the horse to stand in a tall vessel surrounded by ice. The temperature of 0° C. prevents coagulation, the corpuscles subside, and the clear fluid may be removed by pipette. Its composition may be described as serum plus the elements of fibrin. The serum is a thin, transparent liquid, of a pale straw or yellow color, consisting of the liquor sanguinis deprived of fibrin. It contains nearly 90 per cent. of water, is always slightly alkaline, and coagulates when heated, owing to the large quantity of albumen it contains. Fibrin is a white, stringy, elastic substance, which, when the blood is in circulation, is in solution, and cannot be distinguished from the other constituents of the plasma. It may be obtained by stirring some freshly-drawn blood with a stick or bundle of twigs. It is insoluble in water or alcohol: soluble in alkalies, lactic phosphoric, and acetic acids.

THE CIRCULATION.

The circulatory system of the horse, like that in the human body, is carried on by means of the heart, arteries, capillaries, and veins. The heart beats about thirty to forty per minute, alternately receiving blood from the venous system and discharging it into the pulmonary artery and aorta. The arteries, with their elastic and muscular walls, form channels for the blood to the system, assisting the heart in maintaining the circulation and regulating the supply of blood to the different parts. The capillaries are vessels of minute calibre, with thin, permeable, elastic walls, allowing both liquor sanguinis and white corpuscles to pass through their walls into the surrounding

tissues. The veins form channels back to the heart. They are provided with muscular walls and valves, and are sufficiently capacious to hold the total blood of the body.

THE HEART.

The heart is a hollow, involuntary, muscular organ, and acts as a force-pump in maintaining the circulation of the blood. It consists of four chambers, with contractile walls, located in the chest, and surrounded by the pericardium, a fibro-serous bag, in which it works. The pericardium is considerably larger than the heart. It is fixed to the sternum from about the third chondro-sternal joint to within an inch of the insertion of the diaphragm across the ensiform cartilage, while its upper and narrower part surrounds and is attached to the great vessels connected with the base of the heart. It consists of an external fibrous layer and an internal serous sac. In form the heart resembles a cone, slightly flattened from side to side, its base being turned upwards and towards the dorsal vertebræ, from which the heart is suspended by the blood vessels that spring from it; the apex points downwards, backwards, and to the left side, lying at about the level of the last bone of the sternum; the organ extends from about the third to the sixth rib, inclusive.

The heart contains four chambers, two auricles and two ventricles. The cavities of the right side of the heart are, the right auricle and right ventricle, the auricle being placed above the ventricle. Into the right auricle open the two vena cava and the coronary veins—those which supply the heart itself with blood; the auriculo-ventricular opening; openings of one or two small veins of right ventricle; foramina Thebesii, which are small depressions, some of them transmitting minute veins. The blood leaves the right auricle through the auriculo-ventricular opening, and enters the right ventricle, which occupies the antero-inferior part of the right side of the heart. Its outer walls are thicker than those of the auricle. Two openings present themselves in the right ventricle, guarded by valves, the auriculo-

ventricular opening and the pulmonary artery. The auriculo-ventricular opening is guarded by the *tricuspid valves*, consisting of three triangular cusps or segments, which, connected at their bases, surround the opening. The entrance of the pulmonary artery is guarded by three semilunar or sigmoid valves, which consist of semi-circular folds of the lining membrane. When blood passes from the ventricle to the pulmonary artery the valves are laid against the sides of the vessel; when the current is checked a portion of it falls back towards the ventricle, and the valves are now thrown inwards; they become distended, overlap and completely close the tube. The blood, after being purified in the lungs re-enters the heart at the left auricle, which is smaller than the right, but its walls are thicker. It is situated at the left postero-superior part of the heart. It receives two pulmonary veins on each side, and opens into the left ventricle through the mitral valve. The interior of the left auricle is smooth like the right, its appendix presenting musculi pectinati. The remaining opening in the left auricle is the auriculo-ventricular opening, which occupies the floor and communicates with the left ventricle. The blood leaves the left auricle, enters the left ventricle, which is conical, and occupies the posterior left region of the heart. Two openings present themselves—the auriculo-ventricular, guarded by the mitral, and the aortic, guarded by the semilunar valves. The venous blood is carried into the right auricle by the anterior and posterior venæ cavæ. It then passes through the right auriculo-ventricular opening into the right ventricle; thence through the pulmonary artery to the lungs. It returns by the pulmonary veins to the auricle; thence to the left ventricle, which propels it through the aorta and its branches into the system generally, the veins returning it again to the heart. The circulation is, therefore, double, the pulmonary or lesser being performed by the right, and the somatic or greater circulation by the left side.

The arteries are elastic and contractile tubes, which convey the blood from the heart to the capillaries. Each artery has

three distinct coats—an internal, middle, and external. The internal coat is formed of an epithelial layer, a sub-epithelial layer, and an elastic layer. The middle coat is formed of muscle, with a slight admixture of elastic tissue. The external coat consists of fine, connective tissue, with a various amount of elastic tissue arranged longitudinally. The external coat is very tough, while the middle and internal are elastic and brittle. On ligaturing an artery, the internal and middle coats give way, while the external one is left unbroken. The heart contracts and propels the blood from the left ventricle through the aorta, the great artery of the whole body. This, after proceeding about two inches, divides into two large branches. The smaller branch is extended, by a multitude of sub-divisions, to every part of the head and fore extremity; the larger one, in a similar manner, throughout the body and hind extremities. In the smaller arteries anastomoses are frequent, forming a net-work, which pervades every tissue of the body. This is a point of great importance, since the circulation can be thus carried on after the main artery of the region has been obliterated; and it is proved that under such circumstances the smaller arteries of the part increase in size. As the blood nears the extremities, the arteries grow smaller, being divided and sub-divided to supply the various tissues of the body. The blood ultimately reaches the capillaries, which are interposed between the termination of the arteries and the commencement of the veins, forming plexuses, which vary much in arrangement. The capillary vessels are very small, their diameter being about 1.3000 of an inch. The blood flows through the capillaries with less velocity than in arteries or veins. The flow is constant, not intermittent, as in the larger arteries. While passing through the capillaries the blood unloads its nutritive material and takes on effete or waste material, conveying it back to the heart through the veins.

The veins carry the blood from the capillaries to the heart. They ramify through the body like the arteries, but are more numerous, anastomose more freely, and are of greater capacity.

They usually accompany the arteries; but there are exceptions to this rule. The veins have thinner walls than the arteries; their inner coat closely resembles that of the arteries. The middle coat is thinner and less muscular, and contains more white, fibrous tissue than the middle coat of the arteries. The external coat consists of connective tissue and elastic fibers. A feature peculiar to the veins is the existence of valves of various construction, which prevent the blood from returning upon its course, and assist in impelling it toward the heart. The veins of the extremities, neck, and scalp have numerous valves, which are absent for the most part in the deep veins of the abdomen, chest, and cranium. The dark, purplish blood of the veins empties into the heart again at the right auricle; after passing through the auriculo-ventricular opening to the right ventricle, it passes through the pulmonary artery to the lungs, where the impure, dark blood is purified and changed to a scarlet color, and sent again on its round.

The lymphatic system, connected with the blood vascular system, consists of a series of tubes, which absorb and convey to the blood certain fluids, lymph and chyle. They take their origin in every tissue of the body supplied with blood; they carry back into the vascular system any excess of the plasma of the blood which has transuded from the capillaries, and is not required for the nutrition of the tissues.

The lymphatics unite to form two large trunks, the thoracic duct and the right lymphatic vein, both of which enter the venous system near the heart. Delicate in structure and transparent, they are present in nearly every tissue, and although more numerous than the blood vessels, their collective capacity is probably not greater.

RESPIRATORY ORGANS.

Respiration is carried on by the lungs, bronchial tubes, trachea, larynx, and the nasal chambers, with the assistance of the inspiratory muscles and the respiratory nerves. The lungs

are surrounded by the pleuræ, the smooth surface of the latter diminishing friction during the movements of respiration. They consist of two conical-shaped, spongy organs, the right and left, situated in the thoracic cavity. They are separated by the mediastinum, heart, pericardium, and large blood vessels. The right lung is larger than the left, and is more frequently diseased. Healthy lungs float in water, and are of a rosy, flesh color, marked by an irregular marbling or mottling. In consequence of their extremely cellular or porous structure, they are capable of great expansion and contraction during the process of breathing. They consist of lobes, lobules, bronchi, terminal bronchioles, alveolar passages and infundibula, air sacs, blood vessels, and nerves. The lobes are the primary divisions, the right having three, the left two. The lobes are divided into lobules of various sizes, separated by fine connective tissue. The bronchi, on entering the lung, divide and redivide, each of a smaller division entering a lobule. They resemble the trachea, forming in the larger tubes incomplete cartilaginous rings by sub-division. Each terminal bronchiole ends in one or more enlarged passages, called the alveolar passages, from which are given off blind dilatations, the end sacs. The air sacs, or cells, are about 1-100 inch in diameter, lined by nucleated cells. The pulmonary arteries accompany the bronchial tubes. Their terminal branches lie between the air sacs, and send a net-work of capillaries over them. The bronchial arteries arise from the aorta, and are distributed to the bronchi, lymphatic glands, connective tissue, and mucous membrane. The lymphatics arise from the spaces occupied by the connective tissue cells in the elastic tissue around the air sacs, and empty themselves into the perivascular lymphatics, and eventually enter the bronchial lymph glands.

The nostrils furnish the sole means of admitting air to the lungs. They modify the condition of the air. If it is too cold they warm it; if too dry, they moisten it. They are lined by a

delicate, pale, rose-colored mucous membrane, the Schneiderian membrane. The horse, not being able to breathe through the mouth, takes in the air by the nasal chambers only. It then passes into the larynx, which is situated immediately behind and below the nasal chambers, and at the anterior extremity of the windpipe. This not only gives passage to air, but is the organ of voice. The cartilages which form the larynx are seven in number—three single ones and two pairs. The former are the cricoid, thyroid, epiglottis; the latter the arytenoid and cuneiform cartilages. We make special mention of the epiglottis, since its office is so important. It is situated in front of the opening of the larynx, which it completely closes during the passage of food through the pharynx into the œsophagus. It is soft and leaf-shaped, and is so attached that, when the animal swallows, it shuts down and backwards, so as to entirely close the opening of the larynx. Thus the food and water, in their passage to the stomach, are prevented from entering the lungs, but go onward into the œsophagus; after which the elastic muscles of the epiglottis in an instant throw it back to its original position, and the windpipe is open again. The larynx is succeeded by the trachea; running down the neck, it enters the thorax, and terminates at the base of the heart, where it divides into the right and left bronchi. It consists of forty or fifty rings, the ends of which overlap posteriorly, forming a perfect expansile tube. The entire trachea is lined by mucous membrane.

The lungs operate on the same principle as a pair of bellows. When the cavity of the thorax is enlarged by the contraction of certain muscles, the lungs become distended by drawing in air. When the muscles relax, the lungs tend to collapse, expelling most of their contained air. The blood, through respiration, is cooled and loses watery vapor. It gains oxygen and loses carbonic acid gas, which the venous circulation has brought back from all parts of the system.

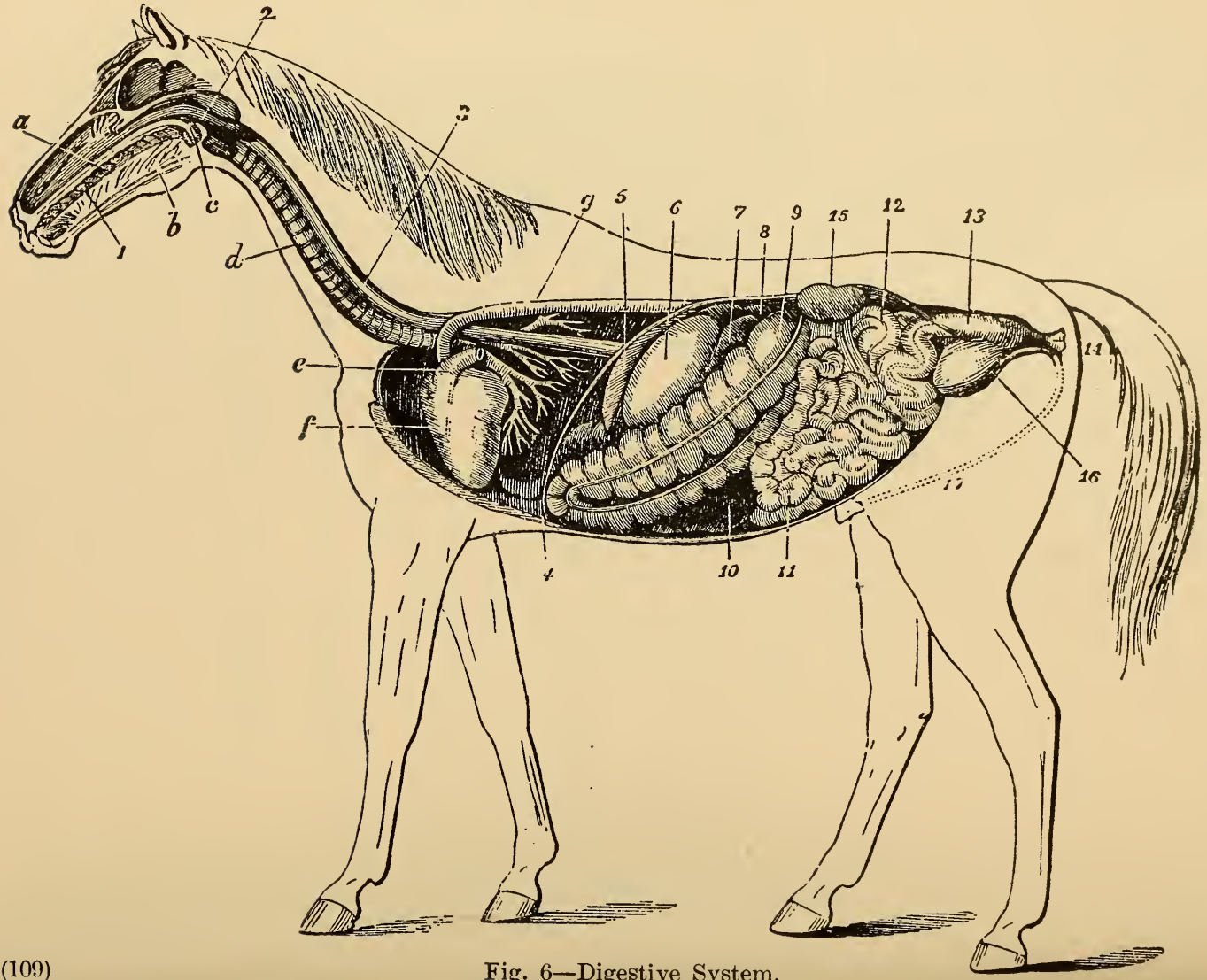


Fig. 6—Digestive System.

EXPLANATION OF FIGURE 6.

Digestive Apparatus of the Horse.

1. Mouth.
2. Pharynx.
3. Œsophagus.
4. Diaphragm.
5. Spleen.
6. Stomach (left sac).
7. Duodenum.
8. Liver (upper extremity).
9. Great colon.
10. Cæcum.
11. Small intestine.
12. Floating colon.
13. Rectum.
14. Anus.
15. Left kidney and ureter.
16. Bladder.
17. Urethra.

A. Hard palate.

B. Tongue.

C. Soft palate.

D. Trachea.

E. Pulmonary artery (divided).

F. Heart.

G. Posterior aorta.

THE DIGESTIVE SYSTEM.

The digestive organs comprise the alimentary canal and its accessories, extending from the lips to the anus. Its walls are composed of muscular tissue, and lined throughout by mucous membrane. It consists of a continuous series of tubes, each of which will be considered in natural order. The food is prepared in the mouth, where it is crushed between the teeth and rolled about by the tongue, to mix it thoroughly with the saliva. The mouth is lined by a mucous membrane, consisting of a stratified epithelium, the superficial cells being flat and horny. The tongue is a muscular organ, which plays an important part in articulation, mastication, and as the organ of taste. The lips of the horse are the organs of prehension, taking up the food. They consist of skin, mucous membrane, muscles, vessels, nerves, areolar tissue, and fat. The cheeks are continuous with the lips, and close the mouth laterally; they consist of an external cuticular, a central muscular, and an internal mucous. The hard plate forms the roof of the mouth, and serves the purpose of assisting the tongue to manipulate the food. The soft palate, or *velum pendulum palati*, is the valvular curtain suspended between the mouth and pharynx, and consists of a double fold of mucous membrane, enclosing muscles, glands, and nerves.

The salivary glands are accessories of the mouth. They secrete the saliva, which is discharged into the mouth, and saturates the food during mastication. There are three pairs—viz., parotid, submaxillary, and the sublingual. The parotid, the largest of the three, is situated in the space bounded by the posterior border of the inferior maxilla and at the anterior border of the wing of the atlas; it lies immediately below and partly surrounds the ear. The glands form a duct, known by anatomists as Steno's duct. It enters the mouth at about the level of the third upper molar. The submaxillary gland lies in the maxillary space, below and behind the parotid, and terminates in what is known as *Wharton's duct*. It opens into the mouth

rather in front of the frænum linguæ. The sublingual gland is situated under the tongue. It opens by from fifteen to twenty small ducts, known as *ducts of Rivinus*. There are other small salivary glands situated in the cheek and under the mucous membrane of the lips. Glands are found at the base of the tongue and along its sides and in the soft palate. The use of saliva is to liquefy starch foods and change the starch into dextrin and maltose. It moistens the food, and therefore assists in mastication and deglutition. It administers to the sense of taste by dissolving the food.

THE TEETH.

The teeth perform a most important function in preparing the food for digestion. The horse, like man, has two sets—the temporary or milk teeth and the permanent set, the former numbering twenty-four, the latter forty. In the mare there are usually thirty-six permanent teeth, the tusks being wanting or rudimentary.

The incisors, or front teeth, in the horse are twelve in number, six in each jaw; the upper ones are longer than the lower. The central pair, or nippers, are called the central incisors, the two adjoining teeth the lateral, while the outer ones, which are the smallest, are termed the corner incisors. The anterior surface of a young incisor tooth presents a triangular shape, with the base at the table. As it wears it narrows laterally, but its short axis widens, until in old age it is nearly round. The incisor teeth have a single fang, which is covered by crusta petrosa. Towards the center of the table, in a young tooth, a second ring of enamel is visible, which is known as the cup, or infundibulum. The cup is ovoid, following that of the table. The cup wears with the tooth, becoming smaller, and ultimately vanishing. It wears away about one-third in each year. The incisor milk teeth are whiter than the permanent ones, and have distinct necks, the necks of the latter being imaginary. The tushes, or canine teeth, are four in number, a pair above and below. They are found in the interdental space.

The crown is somewhat conical, the base being at the gums. They have no constricted neck, and the fang is single. In the horse tribe, as a rule, canine teeth are developed only in the male; if they exist in the female, they are rudimentary. The molars, or grinders, are twelve in the temporary set, three in each side of each jaw; twenty-four in the permanent set, six on each side, above and below; they are numbered from front backwards, and, like the incisors, those of the upper jaw are the larger. The horse may have supplementary molars, or wolf teeth; these are small and placed one on each side of the jaw, anterior to the first molars; they are usually shed with the milk teeth.

INDICATIONS OF AGE.

The horse's age may be determined with considerable exactness by studying the peculiarities which characterize the teeth

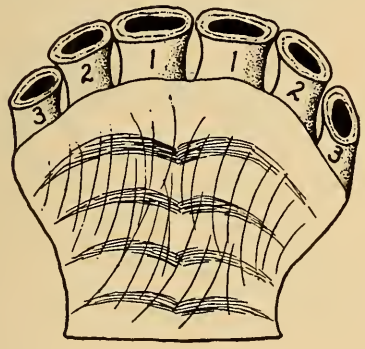


Fig. 7—Upper Incisor Teeth of a One Year Old Colt Showing the Restricted Necks of Milk Teeth.

1, 1. Central incisors in wear. 2, 2. Lateral incisors in wear. 3, 3. Corner incisors in wear. At one year all the incisors are up and in wear.

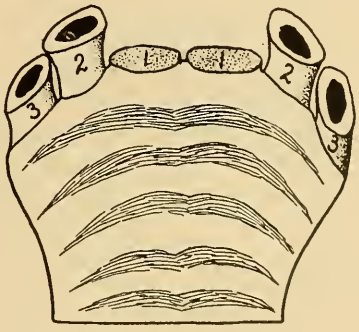


Fig. 8—Upper Incisors of a Two Year and Six Months Old Colt.

1, 1. Showing the two central milk teeth shed and the two permanent ones coming in their place. 2, 2, Milk teeth. 3, 3. Milk teeth corner.

at different periods of life. At or soon after birth the foal has four incisors and twelve molars. The appearance of the incisors at birth depends upon the length of time the foal is carried; it may be carried over the time or be born before the time of their appearance. At an age varying from six to nine weeks, the mid-

dle or lateral incisors appear; the corner incisors are up at the tenth month. When the colt is one year old all the incisors are in wear, and he now has twelve in number. He also has twelve temporary and four permanent molars; hence the colt at one

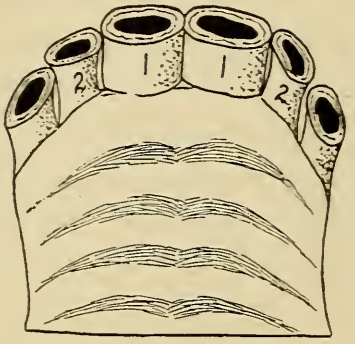


Fig. 9—Upper Incisor Teeth of a Three Year Old Colt.

1, 1. Central permanent incisors nearly full grown. 2, 2. Milk teeth with their restricted necks. 3, 3. Corner milk teeth showing well marked cups.

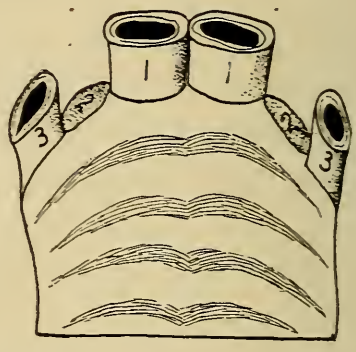


Fig. 10—Upper Incisor Teeth of a Three Year and Six Months Old Colt.

1, 1. Two permanent incisors. 2, 2. Shedding the lateral incisors, and showing the two permanent laterals making their appearance. 3, 3. Corner milk teeth.

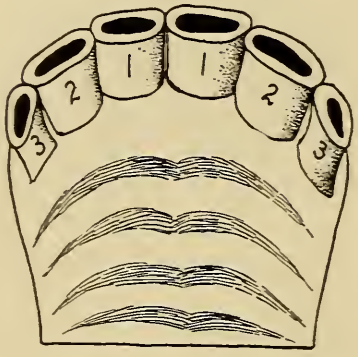


Fig. 11—Upper Incisor Teeth of a Four Year Old Colt.

1, 1. Permanent central incisors.
2, 2. Permanent lateral incisors.
3, 3. Milk teeth.

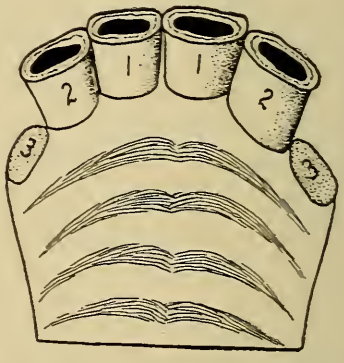


Fig. 12—Upper Incisor Teeth of a Four Year and Six Months Old Colt.

3, 3. Shedding of the corner milk teeth and the permanent ones taking their place. 2, 2. Permanent lateral incisors. 1, 1. Permanent central incisors.

year old has twelve temporary incisors, or front teeth, and twelve temporary molars or grinders, and four permanent molars. Between the ages of one and two years the second permanent molar makes its appearance. It is the fifth in the jaw,

and is up and in wear at two years. With variation of wear, the incisors remain the same during the second year. At two years, the colt has twelve temporary incisors, twelve temporary molars, and eight permanent molars. About the middle of the third year the nippers, or central temporary incisors, fall out, and are replaced by permanent incisors, which are up and in wear at three years of age. About the time of shedding the temporary incisors, two more permanent molars make their appearance, the

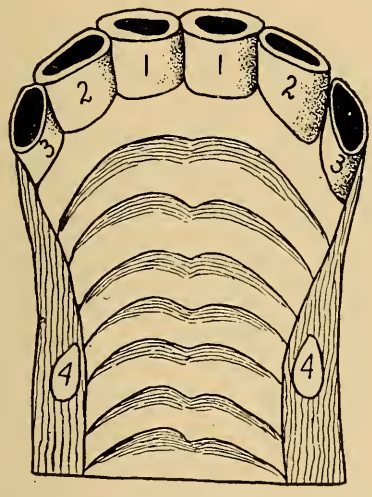


Fig. 13—Upper Incisor Teeth of a Five Year Old Horse.

1, 1. Central incisors with cup unobliterated. 2, 2. Lateral incisors with cups deeper and larger. 3, 3. Corner incisors, still larger cups, with their edges very slightly worn. 4, 4. Canine teeth well developed.

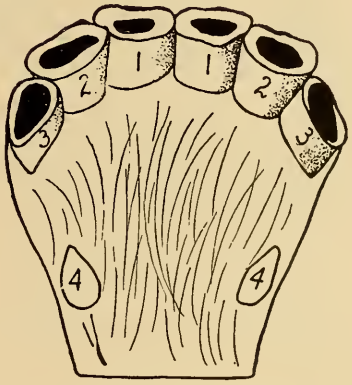


Fig. 14—Lower Incisor Teeth of a Five Year Old Horse.

1, 1. Central incisors.
2, 2. Lateral incisors.
3, 3. Corner incisors.
4, 4. Canine teeth. The cups are somewhat obliterated in the teeth of the lower jaw at five as shown.

first and second in the jaw. Hence at three years the colt has eight temporary incisors, four permanent incisors, four temporary molars, and sixteen permanent molars.

At the age of three years and six months the temporary lateral incisors are replaced by permanent ones. They are up and in wear when the colt reaches the age of four years. The fifth permanent molar now makes its appearance, being the third in the jaw. A little later the sixth makes its appearance; it is also the sixth in the jaw. All the molars are up and in wear at four

years. At four years of age the horse has four temporary incisors, eight permanent incisors, no temporary molars, and twenty-four permanent ones. The permanent corner incisors appear between ages of four and five years. At five years they are up and in wear. At the age of five the canine teeth appear in the male. Hence at five years of age the horse has a full mouth, possessing twelve molars, four canine teeth, and twenty-four molars. At the age of six years the infundibula, or cups,

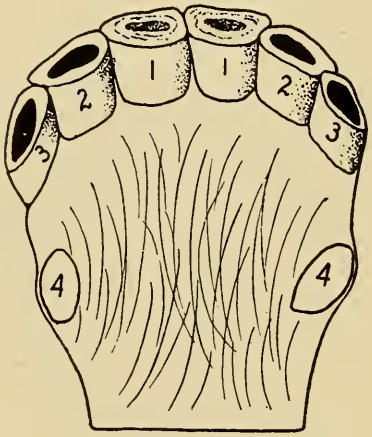


Fig. 15—Lower Incisors of a Six Year Old Horse.

1, 1. Central nippers with cups entirely worn out. 2, 2. Cups disappearing in lateral incisors. 3, 3. Cups still showing plainly with their edges considerably worn. 4, 4. The canine teeth standing up three-quarters of an inch with their points only slightly blunted.

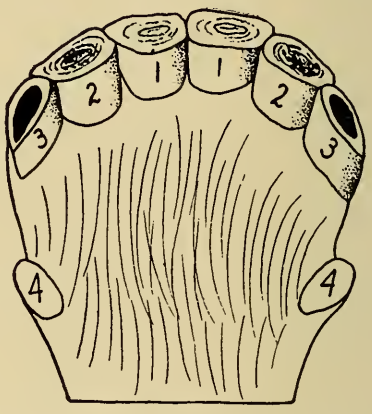


Fig. 16—Lower Incisors of a Seven Year Old Horse.

1, 1. Central nippers with cups obliterated. 2, 2. Cups entirely worn away in lateral incisors. 3, 3. Cups still showing in corner incisors. 4, 4. Not much change in canine teeth.

are worn out of the central incisors, two-thirds worn out of the lateral, and one-third worn out of the corner incisors. At seven, cups leave the central incisors; at eight, cups leave the lateral incisors; at nine, cups leave the corner incisors. At this age the table surface of the lower row of incisors is perfectly smooth. We now notice a little hooklike projection on each of the upper corner incisors. When this hook is on the corner incisors we can mark it down that the horse is at least seven or eight years old. As a rule, the animal reaches the age of nine or ten before the cups leave the central incisors. At ten the cups leave the

upper lateral incisors, and at this time a groove will be noticed in the upper corner tooth. The groove extends half down down the tooth at fifteen years of age, and reaches the bottom of the tooth at twenty-one. At twelve years of age the table surface of the upper row of incisors is found to be worn smooth. The dental star makes its appearance when the animal is eleven years of age. This is a little spot, located on the table of the tooth, differing from the rest of the dentine. The temporary teeth may be readily recognized by their small size, their well-

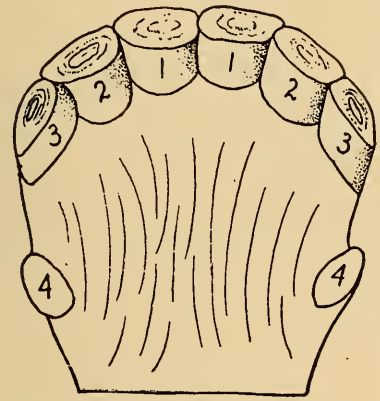


Fig. 17—Lower Incisors of an Eight Year Old Horse.

1, 1. Cups obliterated.
2, 2. Cups obliterated.
3, 3. Cups gone.
4, 4. Cups worn considerably.

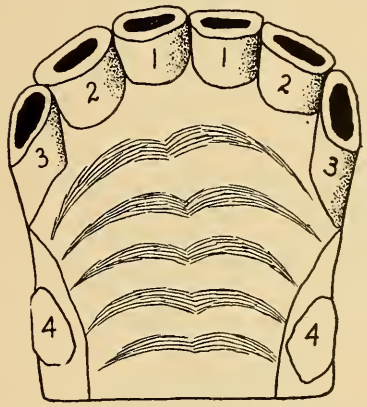


Fig. 18—Upper Incisors of an Eight Year Old Horse.

1, 1. Central nearly smooth. 2, 2. Next pair showing a remnant of the cup. 3, 3. Corner incisors showing cup plain enough. 4, 4. Canine teeth worn down more than in the lower jaw of the six year old mouth.

marked neck, and extreme whiteness. The permanent teeth are darker in color, have no well-marked neck, and are larger. The permanent incisors of the lower jaw show a well-marked groove on the anterior surface of each tooth that is absent in the permanent teeth. The permanent incisors of the upper jaw each show two of these grooves. The young tooth is broadest from side to side, the tooth of old age being broadest from the front backwards, and gradually growing narrower from side to side. After the animal has reached ten years, it becomes somewhat difficult to ascertain his age correctly, but by practice one

may become quite proficient. It requires a great deal of practice, and to succeed in it hundreds of mouths should be carefully examined and the kind of food carefully noted. The teeth of horses of the same age vary considerably in shape, size, etc. We have met with several that at the age of twelve or fifteen had the marks of only eight or nine, and quite a number whose corner teeth never had any hook. Where horses graze in sandy districts, the hooks on the corner teeth are well ground off.

The appearance of the teeth will be considerably modified by the kind of food, the soil and climate, and like circumstances.

Fig. 19—Showing hook in upper corner incisor which makes its appearance at eight years of age. It may be observed coming in at seven.

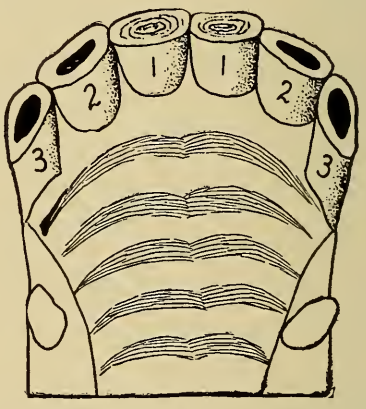


Fig. 20—Upper Incisors of a Nine Year Old Horse.

1, 1. Central incisors with cups entirely worn away. 2, 2. Laterals disappearing. 3, 3. Corner still larger.

Where horses graze in sandy districts, the marks of age are brought on prematurely; an eight-year-old may be easily mistaken for one of twelve years. Some stabled horses chew the brick walls of their stables and wear the teeth abnormally. Some are fed on hard canes growing in river and creek bottoms, which break their nippers. The crib-biter breaks his teeth off in such a manner that no reliable marks of age remain. In order to become proficient in the study of the horse's age, it is necessary, therefore, to examine, we might say, thousands of cases. There are some peculiarities in the teeth of certain breeds of horses. The teeth of the pony are different in several respects from the

large breeds. Tall, bony animals have older-looking teeth than small animals.

The examiner should in every case be careful to note the presence or absence of the ring of enamel that surrounds each

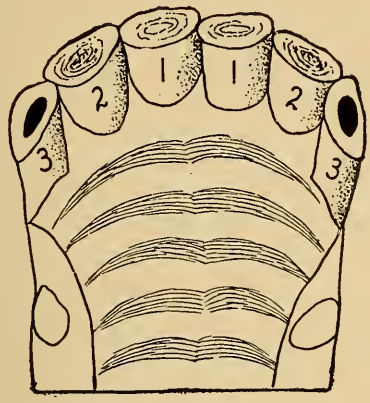


Fig. 21—Upper Incisor Teeth of a Ten Year Old.
1, 1. Cups have left central.
2, 2. Cups have left lateral.
3, 3. Cups still remaining in corner incisors.

Fig. 22—Incisor tooth of a horse showing dental star which makes its appearance when the animal is about eleven years old.

Fig. 23—Upper Incisors of a Twelve Year Old Showing the Upper Row of Teeth All Smooth.

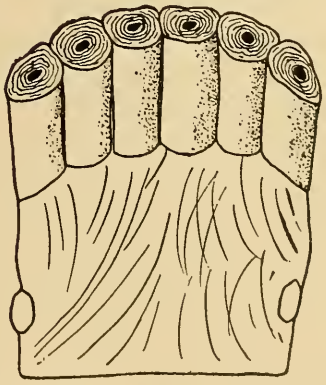


Fig. 24—Lower Incisors of a Fifteen Year Old.

infundibula, as dishonest dealers often make artificial marks to deceive the purchaser. It is said that this swindling operation is of English origin. It is called Bishoping, from the name of the man who invented it. The horse of eight or nine years is thrown, and with an engraver's tooth a hole is dug out in the

now almost plain surface of the corner teeth, so as to present the appearance of the infundibulum of a seven-year-old horse. The hole is then burnt with a heated iron, and a permanent black stain is left. The next pair of nippers is sometimes slightly touched. If the ring of enamel is not present we may rest assured that the depression is an artificial one, since, however expert or clever he may be, a man cannot possibly place or produce a ring of enamel around a false infundibulum.

After the horse is nine years old, we can only guess at his age, or approach within a few years of it, by the changes which the teeth undergo as they advance in age. It would be folly to claim perfect accuracy at this advanced age. At eight the upper surface of the nippers is oval, the length of the oval running across from tooth to tooth, but as the horse gets older the teeth diminish in size, the diminution commencing in their width, and not in their thickness. They become a little separated, and their surface are rounded. At nine the center nippers are evidently so; at ten the others begin to shorten the oval; at eleven the second pair of nippers are round, and at thirteen the corner ones are round. At fourteen the faces of the central nippers become somewhat triangular. At seventeen they are all so; at nineteen the angle begins to wear off and the central teeth are again oval, but in reversed direction—viz., from out inward, and at twenty-one they all wear this form. At about twelve years the teeth are of a yellow color, and, therefore, destitute of enamel. At this age the lower nippers change their original upright direction, and project forward.

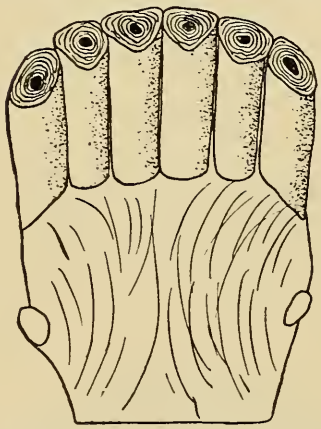


Fig. 25—Lower Incisors of a Twenty-One Year Old Horse.

There are also general indications of the advance of old age aside from those offered by the teeth, such as deepening of the hollows over the eye; loss of its brilliancy and wrinkles under

the lid; the appearance of gray hairs over the eyes and on the forehead; pendulous lips, with a wrinkled appearance; the withers become high and sharp; the chin, or lower jaw, begins to be pointed; the animal becomes more or less sway-backed; the space between the thighs increases, and there is a general appearance of feebleness and decay.

OESOPHAGUS.

The œsophagus, or gullet, is a musculo-membranous tube, lined with mucous membrane, the same in general character as that which lines the different parts of the mouth. It extends from the pharynx, which is simply a continuation of the extreme back part of the mouth, to the stomach. Directly behind the root of the tongue is the opening of the pharynx, and behind this the œsophagus.

The œsophagus has no other use than for the conveyance of aliment from the pharynx to the stomach. The process of deglutition, or swallowing the food, is performed in the following manner: The masticated food gathers as a bolus at the root of the tongue, which, by retracting, forces the pellet through the isthmus faucium into the pharynx; the soft palate recedes backwards and upwards; the food is forced down the epiglottis, closing the larynx; finally the pharynx grasps the bolus and passes it downwards into the œsophagus. The food is propelled along the œsophagus by the peristaltic action of its muscular walls. The act of deglutition is involuntary in the œsophagus, the food travelling by peristaltic motion, caused by the successive contraction of its muscular fibers.

THE STOMACH.

The stomach of the horse is small in proportion to the size of the animal. Its average capacity is about three gallons, while the stomach of man, whose weight is hardly one-eighth of that of the horse, contains frequently three quarts. When distended the stomach resembles a bent tube, with two lateral dilatations, divided by a central constriction into a left, or cardiac, and a

right, or pyloric, portion. It has an opening on the left, leading into the œsophagus, through which the food enters, and another on the right, which communicates with the first portion of the intestine called the duodenum. The walls of the stomach are composed of three coats—an external, middle, and an internal coat. The external coat is simply a serous membrane and a reflection of the peritoneum. The middle or muscular coat consists of three sets of fibers—an external longitudinal, a middle circular, and an internal oblique layer. The action of the different fibers produces a churning motion, which brings each portion of the food in contact with the mucous surface. The internal or mucous coat is different on the right and left portions of the stomach. In the cardiac portion it is called the cuticular. It is continuous with the mucous membrane of the œsophagus, which it resembles in structure and appearance. It is covered by a thick layer of stratified epithelium. It covers about one-third of the internal surface of the stomach. The villous or true digestive coat is reddish in color, soft, very vascular, and velvety-looking. The line of demarcation between the two portions is abrupt and dentated. The colors of the coverings are very dissimilar; the one has a reddish color, while the other is white. The villous portion has shallow depressions, or alveolar, into which the gastric follicles open; at the pyloric end some of these follicles terminate in dilated sacs, or divide into two or more tubes. Some of them secrete gastric juice; others mucous. The use of the stomach is to macerate the food by the action of its muscular walls, and also to saturate it with mucous and gastric juice, the latter containing a principle called pepsine, which acts chemically on albuminous matter. The food during digestion in the stomach is kept in motion by the peristaltic action of its walls. By the contractions of its muscular fibers, currents are set up in its contents, the food travelling along the large curvature and returning by the lesser, while, as digestion proceeds, certain portions are passed through the pylorus into the duodenum.

INTESTINES.

The intestines are divided into the large and small; the two, however, form a continuous musculo-membranous tube, with many widenings and convolutions; their length in an average-sized horse being about ninety feet. The coats of the intestines are similar to those of the stomach. The muscular coat consists of two layers of fibers, an outer longitudinal and an inner circular one. In certain intestinal diseases of the horse the circular fibers contract spasmodically, producing strictures. The small intestines are continuous with the stomach at its pyloric orifice. They are about seventy-two feet in length. When fully expanded they hold about eleven gallons. The divisions of the small intestines by anatomists have received the names of the Duodenum, Jejunum, and the Ileum. The jejunum succeeds the duodenum, and includes about two-fifths of the remainder of the small intestines, the ileum constituting the rest; they are attached to the free edge of the mesentery.

The mucous membranes of the small intestines are furnished with glands and absorbents. Besides the mucous follicles, there are small glands resembling the acini of the salivary glands. They are found in the duodenum, and are known as the glands of Brunner. Very small glands are found throughout the intestines, known as crypts of Lieberkuhn. The Peyer's patches are found in the jejunum and ileum. They are oval or circular groups of solitary glands. Other solitary glands, scattered throughout the intestines, resemble very much the sacs forming Peyer's patches. The absorbents originate in the villi, which are small finger-like vascular processes, thickly distributed over the mucous surface, consisting of loops of the lacteal vessels, surrounded by a network of capillaries, fine muscular fibers, and small, granular corpuscles.

The large intestines consist of the cæcum, the great colon, the floating colon, and the rectum. The cæcum is much larger than the small intestines. It measures about thirty-six inches in

length, and its capacity may average six gallons. It is somewhat conical in shape, curved at its supero-posterior extremity, presenting on its outer surface a number of circular constrictions and longitudinal muscular bands. The great colon is very large, measuring on an average from nine to eleven feet in length, and sometimes having a capacity of eighteen gallons. It has numerous transverse furrows and longitudinal muscular bands externally, and internally it resembles the cæcum. The floating colon succeeds the great colon, and is convoluted. Its length is about ten feet. It is suspended by the colic mesentery. The contents of the colon, made up of the coarser parts of the food, become hard and solid, being deprived of nearly all moisture and nutrition.

The rectum or straight intestine extends in a direct line from the entrance of the pelvic cavity to the anus, and resembles in structure the floating colon, but its walls are thicker. Its serous coat is a reflection of the peritoneum; the muscular coat is very strong, consisting of longitudinal bands, with circular fibers beneath them. In the spaces between its transverse ridges the fæces assume their characteristic shape.

The anus is the posterior opening of the alimentary canal. Lying below the root of the tail, it forms a round projection, which becomes less prominent with age. It consists of thin, hairless skin externally and of mucous membrane internally, the two being continuous.

THE LIVER.

The liver is a solid gland, located in the abdomen. It is the largest secreting gland in the body, weighing from ten to twelve pounds. The coverings of the liver are an external serous and an internal fibrous coat. It is situated in close proximity to the right side of the diaphragm, and is divided into three lobes. Its normal color is a coal brown, but it varies in color from different diseases. It consists of very minute lobules, varying from about 1-17 to 1-13 of an inch in diameter, separated from each other

by the interlobular tissue continuous with Glisson's capsule. The principal function of the liver is to secrete bile. The blood of the portal vein, returned chiefly from the abdominal alimentary canal, is charged with bile. The bile is removed by the vital power of the hepatic cells, while the blood is passing through the interlobular capillaries. The blood, thus deprived of bile, passes into the interlobular veins, and so into the sublobular and hepatic veins, while the bile gains the bile tubes, and ultimately the hepatic duct, to be poured again into the intestine. Most animals are provided with a gall bladder, in which the bile accumulates during the period of abstinence, and passes into the intestinal canal when digestion commences. The horse has no gall bladder; the bile, as fast as it is formed, flows directly into the small intestines, entering through the biliary duct a few inches below the pyloric orifice. Bile is an alkaline, golden yellow fluid of a bitter taste and specific gravity 1018, and containing about 14 per cent solid matter. It is used in converting starch into sugar, assists in emulsifying and saponifying fats, assists in the absorption of fats, increases peristaltic action, and prevents putrefactive changes in the intestines.

THE PANCREAS.

The pancreas is an elongated, lobulated gland, which lies across the abdomen, behind the stomach and in front of the kidneys. It is of a reddish, cream color. It belongs to the class of compound racemose glands, and closely resembles salivary glands. Pancreatic juice is a clear, viscid alkaline fluid resembling saliva, but of greater specific gravity, and containing from 2 to 5 per cent of solid matter. It changes proteids into peptones in alkaline or neutral solutions, afterwards decomposing them into leucine and tryosine. It converts starch into dextrin and sugar, and emulsifies and saponifies fats.

SPLEEN.

The spleen is a soft, reddish-gray organ, situated on the left side of the great curvature of the stomach. It is an exceedingly vascular, ductless gland, having no excretory canal. It weighs from two to four pounds. Physiologists have been unable to demonstrate its use.

The abdomen and part of the pelvis are lined by peritoneum. The internal surface is smooth, free, moist, and covered by scaly epithelium; it secretes a serous lubricating fluid. A mesentery is a broad, double fold of peritoneum, attached to the abdominal parieties above, and containing a portion of the intestine in its free or remote extremity.

THE URINARY ORGANS.

These are chiefly the kidneys, ureters, bladder, and urethra. The kidneys are two compound tubular glands, situated on the right and left of the vertebral column, in the sublumbar region of the abdomen, or under the loins. In the horse they are large; the right one is in advance of the left, lying just behind and beneath the last pair of ribs. They somewhat resemble in shape the heart on playing cards. The kidneys are made up chiefly of the tubes of the gland termed the uriniferous tubes, with blood vessels and nerves and connective tissue. The function of the kidneys is to secrete the urine, a fluid consisting of water holding in solution a varying quantity of earthy salts and a peculiar nitrogenous substance, urea, which, if not eliminated, acts as a blood poison. The urine is secreted by the kidneys and carried off by their ducts, the ureters, to a special reservoir, the bladder, where it accumulates, and from which it is finally expelled at intervals through the urethra.

The bladder is situated within the pelvic cavity, and when full projecting into the abdomen. It serves as the reservoir for the urine, storing it, and at intervals, by contraction of its walls, forcing it into the urethra or excretory tube. It is a musculo-

membranous organ. It consists of three coats—a mucous, muscular, and a serous coat. The serous coat only partly invests it, covering the upper half or more of the posterior wall, and being reflected from the sides and apex to the surrounding parts. The muscular coat consists of two layers of smooth, muscular fibers, an external longitudinal one and an inner circular layer, thinly scattered over the body, but denser at the neck, forming the sphincter vesicæ. The mucous coat is pink and smooth; it is thrown into wrinkles, except at the trigone, where it is adherent to the muscular layer beneath.

The ureters are two membranous canals, which convey the urine from the kidneys to the bladder. They have an external fibro-cellular, a middle muscular, and an internal mucous coat lined with epithelium, similar to that of the bladder.

NERVOUS SYSTEM.

The nervous system embraces those organs which receive and interpret impressions, stimulating and regulating the vital functions. The system is divided into the cerebro-spinal and the sympathetic. The former includes the brain, spinal cord, certain ganglia, motor, and sensory nerves. The motor nerves are supplied to the voluntary muscles; the sensory are distributed to the organs of sense, skin, and other parts endowed with sensibility. The sympathetic consists of a series of ganglia and nerves, which supply the involuntary muscular fibers of the uterus, stomach, intestines, ducts, and blood vessels.

The two systems are so intimately connected with each other that they can hardly be considered as distinct. The sympathetic system may be regarded as that portion which supplies the internal organs and blood vessels, having its own central and peripheral organs, like that of the cerebro-spinal. The two systems have free inter-communication, ganglia being placed at the junctions.

The nerve consists of bundles of nerve fibers bound together by a common tissue sheath. This sheath surrounds the whole

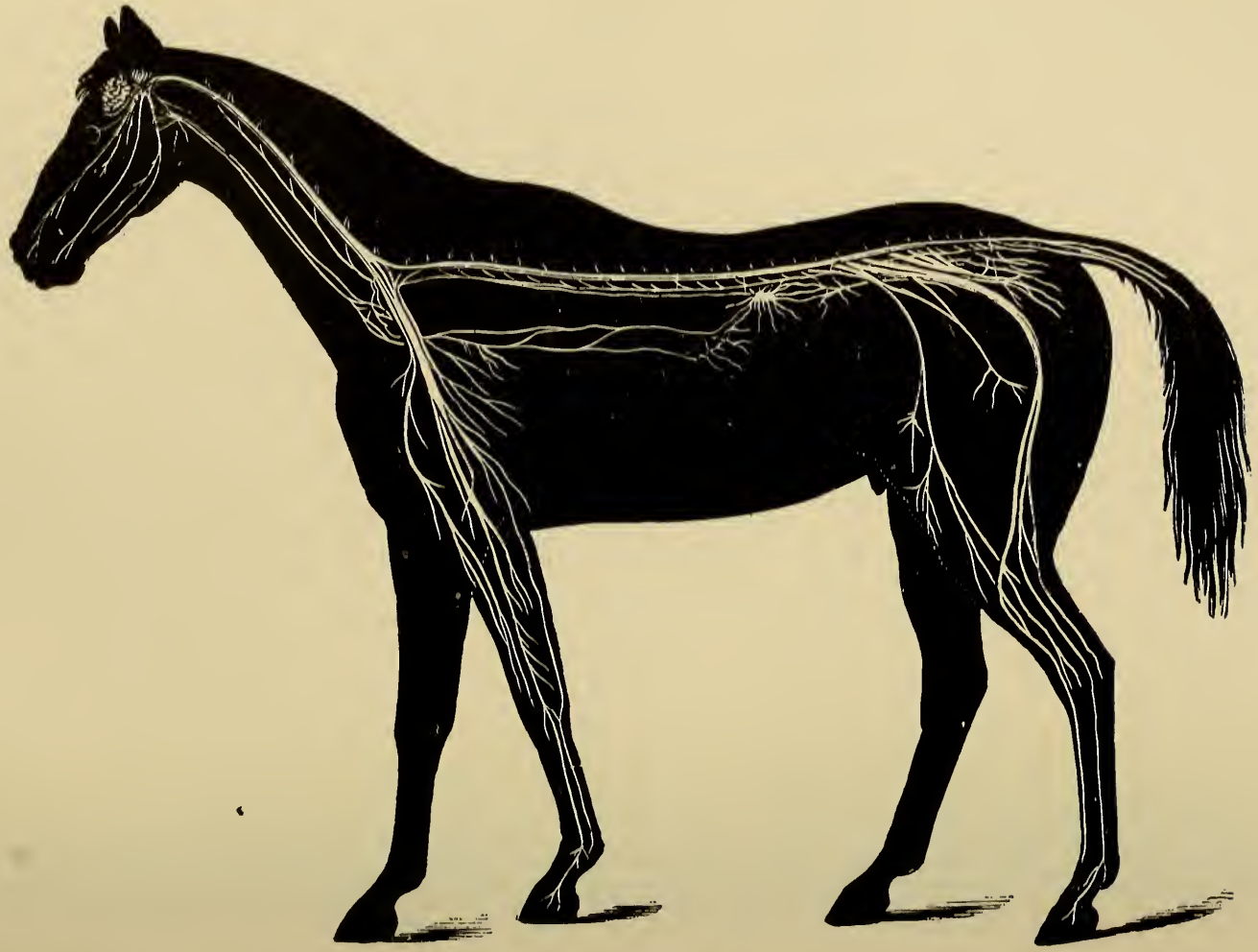


Fig. 26—Nervous System.

nerve and binds its bundles together. It contains blood vessels, lymphatics, connective tissue, cells, and adipose tissue. Nerves which convey impressions to the centers are termed centripetal or afferent; those which transmit stimuli from the centers to the various organs are termed centrifugal or efferent, while those which pass from one center to another are called inter-central. Centrifugal are called motor, supplying muscles; vasomotor, supplying the muscular fibers of the blood vessels; secretory, supplying glandular epithelium; inhibitory, modifying the actions of the nerve centers; trophic, regulating the nutrition of a part.

Centripetal nerves, which convey common sensation, pain, touch, etc., are termed sensory. When they convey impressions peculiar to an organ, as the nerves of sight and hearing, they are known as nerves of special sense. Nerves conveying impressions which lead to the stimulation of motor nerves are termed excito-motor; if to that of secretory nerves, excito-secretory; and if to that of inhibitory nerves excito-inhibitory. This reflection of nervous impulse from one nerve to another is known as reflex action. There are many things difficult and sometimes inexplicable about the nervous system and its operations.

The cerebro-spinal system has for its center the cerebro-spinal axis, consisting of the brain and spinal cord, which, like their coverings or meninges, are continuous with each other. The brain of the horse corresponds to the cavity in which it is placed. It is a flattened oval, divided into two parts, one much larger than the other—the cerebrum, or larger portion, and the cerebellum, or smaller portion. In the horse the cerebrum is below the cerebellum, and occupies the anterior portion of the cranial cavity. It is ovoid in shape, with an irregular flattened base, and consists of lateral halves or hemispheres, separated by a longitudinal fissure. The cerebellum or lesser brain is lodged in the posterior part of the cranial cavity, immediately above the

medulla oblongata, which is the prolongation of the spinal cord. It is globular in shape, its transverse diameter being the greater.

The membranes of the brain are the Dura Mater, Arachnoid, and the Pia Mater. The dura mater is the thick, white fibrous membrane which lines the cavity of the cranium, acting as the internal periosteum of the bones. The middle one, called the arachnoid, is a serous membrane of the ordinary character. The pia mater is closely adherent to the entire surface of the brain, dipping into every fissure or depression, into the sulci between the convolutions, and passing into the interior in several places.

The human brain exceeds, in comparative bulk, that of the dog, the horse, or the ox. Thus are they classed in the order of intelligence. The human brain weighs, on an average, 50 ounces. The average weight of the horse's brain is 23 ounces. From the medullary substance proceed nerves by which the animal is enabled to receive impressions from surrounding objects, and also to experience many pleasurable or painful sensations. One of them goes to the nose, and gives the special sensation of smell; another to the eye, and sight is produced; another to the ear, and the animal is conscious of sound; another to the tongue, and the taste is produced. Other nerves, proceeding to different parts, stimulate the faculty of motion; others stimulate the sense of feeling. Nerves which have their centers in the medulla supply the respiratory organs, and the horse breathes. The vasomotor center is the center of the sympathetic system supplied to the muscular fiber of the blood vessels. They go to the stomach, and it digests; to the heart, and it beats; to the œsophagus and pharynx, and deglutition is performed; to the vocal chords, and voice is produced; to the mouth, and mastication is performed; to the salivary glands, and saliva is secreted. All of these have their centers in the medulla.

The muscles of the body are kept in a constant state of contraction or relaxation by nerve centers in the spinal cord. The centers for micturation and defæcation appear to exist in the lumbar region of the spinal cord. The centers that govern the

movements of the uterus and erectile tissue are situated in the lumbar region of the cord. All along the spinal cord, from its origin to the tail, other nerves are given off at certain intervals. The spinal cord is composed of six distinct rods running through its whole length, three on each side, and the fibers of the two columns proceed to their destinations, enveloped in the same sheath and apparently as one nerve. They are united, yet distinct, apparently constituting one nerve, yet neither their substance nor their office is confounded. The cerebrum seems to be the seat of intelligence and will; the cerebellum seems to combine and balance the several muscular actions of the body; the medulla oblongata superintends respiration, mastication, and deglutition. Besides these are the ganglia, which are intended to subserve what are called the reflex actions of the organs of locomotion, etc., occupying the whole length of the spinal cord, one on each side. There are also the sympathetic systems of ganglia, which especially control the vital organs of circulation, digestion, and excretion.

THE MALE REPRODUCTIVE ORGANS.

These consist of two testicles or seminal glands, with their excretory tubes, a musculo-glandular organ, the prostate, which provides a material for the dilution of the semen, and by its sphincteric contraction aids in the ejaculation of the spermatic fluid, at the same time intercepting its retrograde passage into the bladder; an organ of copulation, the penis, and a canal, the urethra, which pierces the prostate and penis, and serves as the transit for both the generative and urinary secretions. The testicles are two in number, and lie in a common pouch of integument, called the scrotum. In fetal life they are at first situated in the abdominal cavity behind the kidneys. At a certain period they descend through the vaginal canal into the scrotum. They are glandular organs which secrete the semen. Lying upon the posterior border of each testicle is a narrow flattened body, termed the epididymis. The testicles are sus-

pended by the spermatic cord. The left is supposed to hang somewhat lower than the right in most cases. The vas deferens, the continuation of the tube of the epididymis, is the excretory duct of the testicle. It ascends along the inner side of the testicle and epididymis, through the spermatic canal to the internal abdominal ring. The spermatic cord is composed of arteries, veins, lymphatics, and the vas deferens. It extends from the internal inguinal ring, where its component structures are collected together through the inguinal canal, and in the scrotum as far as the summit of the testicles. The vesiculæ seminales are two reservoirs situated between the bladder and rectum. They receive the semen from the vas deferens and secrete a fluid which is mixed with that of the testicles. In these reservoirs the sperm accumulates, and is expelled by the contractile walls of the vesiculæ, during the act of copulation, through the ejaculatory ducts into the urethra. The ejaculatory ducts, one on each side, are formed by the junction of the duct of the vesiculæ seminales with the vas deferens. The urethra is a tube which extends from the neck of the bladder to the glans penis. It consists of two layers, a mucous and an external fibrous. It is divided into prostatic, membranous, and spongy portions.

The penis is the organ of copulation, and is divided by anatomists into a root, body, and extremity or glans penis. The root is attached to the pubis by two fibrous processes. The substance of the penis is formed of what is called erectile tissue, a tissue which, under certain circumstances, becomes enormously distended with blood. The erectile structures are two in number, the corpus cavernosum and the corpus spongiosum. The corpus cavernosum, much the larger of the structures, forms the superior and lateral portions of the penis. The corpus spongiosum encloses the urethra, is situated in the inferior groove of the corpora cavernosa, and is surrounded by the accelerator muscles. The glans penis forms the terminal extremity of the penis, and is an enlargement of the corpus spongiosum. At its apex is a deep fossa, in the center of which lies the meatus urinarius,

bounded by two prominent lips. The sheath is a loose process of integument which invests the free portion of the penis. It forms a corrugated sack, extending from the scrotum, with which it is continuous, to a varying distance forward. Anteriorly, a loose double fold of the sheath projects, covering the anterior extremity of the penis completely. This is known as the prepuce, or foreskin.

THE FEMALE ORGANS OF GENERATION.

The female genitals may be divided into an external part, the vulva, a vaginal passage, the cavity of which appears as a fissure in its ordinary condition, but is capable of very great dilatation; an internal apparatus comprising the organs of ovulation (ovaries) with their ducts, and a musculo-mucous sack (uterus), in which the ovum undergoes development, and by which the fetus is ultimately expelled. The ovaries, being analogous to the testicles in the male, are the ultimate organs of generation in the female. They are similar in shape, but smaller than the testicles, and are situated in the sublumbar region of the abdomen, being suspended from its roof a little behind the kidneys. They are attached anteriorly to the broad ligament of the uterus behind and below to the fallopian tube. Beneath the coat of the ovaries lies the graffian vesicles, or ovisac. Each sac contains a fluid secreted by cells, and this fluid increases in quantity as the vesicle develops. Ultimately the wall of the ovary and the graffian follicles give way, the ovum escapes into the fallopian tube, and is conveyed by it into the womb. The fallopian tubes are two canals, which convey the ova from the ovaries to the uterus.

The uterus, or womb, is a musculo-membranous sac situated in the sublumbar region and pelvic cavity; it consist of a body and two cornua. It is properly the organ of gestation. Its office is to retain and support the fecundated ovum during the development of fetal life. It consists of three coats—a serous, muscular, and mucous. Projecting posteriorly is the neck of the

womb, which is thick, round, and projecting in the virgin. In the center is a transverse aperture or fissure opening into the vagina and closed during utero-gestation. The vagina is a membranous canal in the center of the pelvis, extending from the uterus to the vulva and situated between the rectum and bladder. It consists of two membranes, an inner mucous and an outer muscular. Constricted at its origin, the vagina widens at its inner portion and surrounds the neck of the uterus. The vagina is the chief female organ of coition.

The vulva is the external orifice of the urino-genital system, and is situated in the perineal region immediately below the anus. It presents two lips and two commissures. In the interior of the vulva and in a depression on its floor lies the clitoris, which originates by two crura from the ischial arch, and is attached to the symphysis by a suspensory ligament. The clitoris is similar in its structure to the penis of the male, and is the principal organ of sexual pleasure in the female; having erectile tissue and cavernous vessels, it becomes erect during copulation. The external orifice of the urethra, the meatus urinaris, opens on the inferior surface of the vulva, about four inches from its opening. It is larger than the male opening and surmounted by a fold of mucous membrane, which acts as a valve.

The hymen is a thin semilunar fold of mucous membrane which separates the vulva from the vagina, lying immediately before the meatus. It is ruptured during the first act of copulation.

The mammary glands are compound racemose glands, which secrete milk for the nourishment of the recently born animal. They become developed at the age of puberty. The interior of the mamma is composed of lobes divided into still smaller lobules composed of minute ducts and numerous small cells, in which the milk is secreted and conveyed to the ducts, which unite to form a common excretory duct of each. From these ducts proceed the canals that convey the milk to the teat.

VII.

REMEDIAL MEASURES AND REMEDIAL METHODS OTHER THAN DRUGS.

MASSAGE.

The word massage is used as the generic name for external manipulations employed for the purpose of affecting the nerves, muscular system, and general circulation. It has been practiced on animals and man from time immemorial, and is of great value in the lower animals. The rubbing and grooming of the race horse after the contest is a form of massage which is paralleled by the rubbings and manipulations employed by the early Greeks and Romans after the struggle in the arena. Massage has grown out of the practice of simply rubbing the skin. It has reached a high degree as a remedial measure in human patients, and requires considerable training and aptness for practicing the art. Its good results are best achieved in the horse. In practicing massage upon the horse, it is not necessary that the operator be a highly educated person. It is essential, however, that the masseur have sufficient knowledge of anatomy to understand the general drift of the circulation, the position and shape of the muscles, and of the muscle masses.

Massage is of great value in general conditions of lack of muscular tone, nervous exhaustion, and failure of the peripheral circulation. In some local diseases affecting chiefly muscular tissue, its influence is most pronounced. By the influence of massage on circulation and nutrition, the contents of the blood vessels are moved onward, all backward movements of the blood being prevented by the valves of the veins and by the propelling power of the heart and arteries. Fluids outside these vessels pass through their walls to take the place of the stagnant blood

that has been moved onward. Other blood flows into the parts, and thus active and healthy circulation is induced, and nutritive material, capable of affording vital support, is also brought to refresh the local part. The movements of massage may be arranged in three groups—first, stroking; second, kneading; third, percussion. In properly performed general massage, all these movements are practiced at a single seance in the order in which they have been named. The stroking movement should always precede the others, and be directed from the feet to the body. In making the strokes, both hands should be employed. The limb is grasped with one hand just above the other in such a way that pressure is exerted to some extent by the whole palm, but especially by the ball of the thumb and the minor surface of the last two phalanges of the fingers. The hands are moved alternately, the second hand taking up the motion of the first hand where it has ceased, and while the movement is being executed by the second hand, the first hand returning to its original position. The strokes in the horse must be made with vigor and firmness, and with great regularity.

In kneading, the endeavor of the operator is to pick up the individual muscles or muscle groups between the fingers of the two hands, or in some cases between the thumb and finger of one hand, and then to roll or squeeze the muscle with a double movement. The series of pinchings is carried from the insertion of the muscle towards its origin. The second hand should follow rapidly upon the first in duplicating the stroke. For an example, the operator should start on the limbs at the feet and carry his series of pinchings to the body.

Percussion is made either with the points of the finger brought into a line with one another, or with the side of the hand and fingers; the fingers should be so held as to have looseness and elasticity. The blows should be at right angles to the fibers of the muscles, and the whole series of blows carried from the insertion towards the origin of the muscle. During prolonged muscular inaction, whether from indolence, disease, or other

causes, the muscular structure itself suffers and the peripheral circulation becomes very feeble. Much of the albuminous liquid which escapes from the blood vessels and diffuses itself through the tissues, after serving the purpose of nutrition, is taken up by the lymphatics and returned to the great blood vessels. If there be any driving of this liquid from the periphery to the center it is so feeble that the return of the juices depends chiefly upon the squeezing of the various juice channels during muscular contraction. During habitual inactivity, the movement of fluids in the juice channels outside of the blood vessels is excessively sluggish, and it is one great object of the stroking movements in massage to force these juices onward. General stroking movements, if properly administered, are very quieting to the patient, removing nervousness and even pain.

The kneading and percussion movements of massage act chiefly upon the local circulation. Both these processes have a distinct effect upon the capillary circulation. Where the fibers of the muscles within their sheaths become agglutinated, and the skin itself becomes abnormally tense and attached to the subdermic tissue, as a result of rheumatic muscular affection and bad condition of the system generally, kneading has the power to remove this condition by mechanically loosening the agglutinated fibers and by so stimulating the local circulation as to cause absorption of exudations. This condition is generally known as hide-bound.

The first seance in general massage should not last longer than from twenty minutes to a half hour, but in a little time a full hour will be required. When there is lack of digestive power, constipation, or similar symptoms—the outcome of sluggishness of the abdominal circulation and nerve supply—local massage of the abdominal and pelvic region should be freely employed. In the treatment of sprains local massage is beneficial after the first stages of inflammation and irritation have passed. In muscular rheumatism or chronic inflammation of the joints, it is of great value. In various forms of paralysis local massage is of

great value as a means of maintaining the nutrition of the affected muscles. It may be employed in all forms of paralysis. In no other class of animals is general massage so beneficial as in the horse. Good grooming and rubbing is worth almost as much to the horse's improvement, and taking on flesh, as his food.

VIII.

INFLAMMATION.

Definition.—Inflammation may be defined as the succession of changes which takes place in a living tissue as the result of some kind of injury, provided that this injury be insufficient, immediately, to destroy its vitality.—*Sanderson.*

The process of inflammation is essentially the same in warm and cold blooded animals, and by microscopial examinations it has been proven to be the same in man. The process of inflammation comprises changes in the blood vessels and circulation, exudation of fluid and of blood corpuscles from the vessels, and changes in the inflamed tissues. These changes all go on together. Inflammation causes a dilation of the arteries, which gradually extends to the veins and capillaries. It affects arteries chiefly, then the veins, and the capillaries but slightly. The enlargement of the blood vessels is associated at the commencement of the process with an acceleration in the flow of blood, and is followed by a considerable retardation in the circulation, the vessel still remaining dilated. As the stream gets slower white corpuscles are seen in increasing numbers in the plasmatic layer in the smaller veins, rolling slowly along, sticking here and there, and finally coming to a standstill, until the vessels are lined with them. This narrowing of the veins by layers of white corpuscles, among which there are no red corpuscles, increases the obstruction to the circulation, which becomes slower and slower until all onward movements cease in the capillaries. Finally, thrombosis or coagulation may take place, but not until the capillary walls are dead.

There is an escape of fluid and of blood corpuscles from the vessels. The leucocytes immediately adjacent to the wall gradually sink into it and pass through into the surrounding tissues.

A similar escape takes place, but to a less extent from the capillaries. In some inflammation the escape of red corpuscles even exceeds the white. It is certain that all new cells found in inflamed tissues, as a direct result of the injury which caused the process, are escaped blood corpuscles. The tissues of an inflamed part are softer than natural, watery or solid looking, and in either case the component tissues are blurred or altogether indistinguishable.

Having thus briefly described the succession of changes which occur in the process of inflammation, we will next consider how an injury can produce them. It has been held that injury causes abnormal conditions of the blood, of the tissues, of the nerves, and of the blood vessels. On one or other or all of these parts it necessarily must act. The essential lesion of inflammation is a change in the vessel wall, resulting from an injury, which increases the friction naturally offered to the passage of the blood, and is a step towards death. To cover all that we know of the escape of fluid and corpuscles, it is necessary to assume that the molecular change not only increases the friction between the blood and the vessel wall, but also that it renders the latter more porous. The signs of inflammation are redness, heat, swelling, pain, and impaired function. Redness and heat may be taken together as depending upon the quantity of blood passing through the part in a unit of time. Swelling is caused by exudation of fluid and corpuscles. Pain is due to pressure of the effusion on nerve endings, perhaps also to chemical violation of them. Impaired function is due to the fact that every tissue is injured by inflammation.

The following varieties of inflammation are to be regarded as steps in the process of inflammation due to variation in the resisting power of the tissue, the intensity of the cause, and the duration of its action:

Serous Inflammation.—As a result of slight injury, the normal transudation from the vessels is increased in quantity and contains excess of albumen, but very few leucocytes. The best

examples are chronic effusion into serous cavities, the pleura joints, or tunica vaginalis (hydrocele).

Fibrinous Inflammation.—In this form the exudation is still more richly albuminous and contains more leucocytes; it consequently has a much greater tendency to coagulate, and lymph forms on the inflamed surface or in the substance of the inflamed tissue. The most typical examples are found on serous membranes.

Productive Inflammation.—This is the case when the inflammatory process ends in the formation of new tissue. In this case any fiber present disappears before the leucocytes, which crowd into the lymph and convert it into a tissue of closely-packed leucocytes in a scanty homogeneous matrix. To supply this with nourishment, vascular loops spring from the capillaries of the inflamed tissue and penetrate into the lymph in all directions; this is granulation tissue.

Ulcerative Inflammation.—We have seen that suppuration in the substance of tissues produces molecular disintegration of them; as a rule, indistinct slough is found in pus. The same molecular distinction, eating away the tissues on a free surface, constitutes ulceration.

Hemorrhagic Inflammation.—This form of inflammation is characterized by an exudation in which red corpuscles are in great excess. The results of inflammation are resolution, adhesion, effusion, suppuration, ulceration, and mortification, or gangrene. Resolution is the most frequent and most favorable termination of inflammation. It consists in the cessation of the process and the restoration of the part to health. The corpuscles of the stagnant blood move off, one after another, till a slow stream is re-established through the inflamed area; the flow quickens as resistance lessens and as the vessels contract, owing to gradual recovery of their muscular coats; exudation, first of corpuscles, then of fluid, ceases, and the circulation again becomes normal. Whatever favors the re-establishment of normal circulation in the inflamed area will favor resolution. This may

be done by a soothing application. The exudation may solidify, in which case applications are to be made to break down the structure, and as a liquid it may be got rid of. Adhesive inflammation is where there is inflammatory action, and the exciting causes are kept up until a permanent thickening of the affected part results. Effusion is where an exudation of serum takes place, as in inflammation of the pleura, etc.

Suppuration, or the formation of pus, presents two parts for consideration—a liquid and a solid, the corpuscles being the solid. It may take place in different ways or in different forms—circumscribed, diffused, and superficial. Circumscribed suppuration is in the form of an abscess. Diffused suppuration is such as takes place over an extensive surface, as in the shoulders and injuries to large muscles. Superficial, as in the mucous membrane. Ulceration also occurs as a result of inflammation; the tissues degenerate and are thrown off in exudation. It occurs usually in cases where the inflammation has been long continued, and the circulation of blood in the parts obstructed, and molecular death of the part occurs. Gangrene is death of a part, and may take place without inflammation. Gangrene affects the whole system, and sets up such a constitutional disturbance that death often follows as a result. In cases, where recovery takes place, the gangrenous portions are removed by sloughing.

Treatment of Inflammation.—The first step is to find and remove the exciting cause. The inflamed parts should be kept at rest. The animal should be dieted and placed in a comfortable box. Medicinal remedies may be either local or constitutional. Cold water as a local application, to allay inflammation, is used extensively. It acts by contracting the vessels. Warm water is also of great use where the pain is very severe and the deep-seated structures are involved. Its action is opposite to cold; the warmth promotes swelling and relaxation of the tissues, allaying pain and irritability. Hot or cold applications must be kept up for some time. Purgatives are useful in inflammation, the best being aloes for the horse, sulphate of magnesia for the

cow, and syrup of buckthorn and jalap for the dog. They are of the greatest benefit in such disease as laminitis, but must be withheld in inflammation of the lungs. Sedatives are useful in the treatment of inflammation, as aconite, digitalis, belladonna, calomel, and tartar emetic. Diuretics are extensively used in our practice, the best being the neutral and alkaline salts, nitrate of potash, etc. Opium is also good where much pain is present. Counter-irritants are of very great benefit in the treatment of inflammation, especially when deep-seated and chronic.

IX.

FRACTURES OF BONES.

A fracture may occur in three ways—first, by external violence, operating directly upon the injured part; second, by external violence, producing such concussion upon the bone as not to break it where the force is applied, but at some other part; third, by inordinate action of the muscles, as in broken back. Some bones are more liable to fracture than others. The bones of the pelvis, shoulders, thighs, pasterns, and vertebræ seem to be more frequently broken than others. Bones in a diseased condition are liable to fracture from trivial causes. The bones of old horses are more readily broken than those of the young.

A solution of continuity of bone (fracture) may be transverse, oblique, or longitudinal, according as it is at a right or an acute angle with, or parallel to, the long axis of the part of the bone in which it is situated. There are several varieties of fractures, known as simple, compound, comminuted, and complicated. A fracture is said to be *simple*, when a bone is broken at one part, without any injury of soft parts; *compound or open*, when the broken ends separate, pierce the soft tissues, and injure the skin; *comminuted*, when the bone is broken into several fragments; *complicated*, when, together with the fracture, there is a serious injury to the joining structures, as laceration of blood vessels, nerves, open joint or serious contusion of the tissues. There may be fractures without displacement, as sometimes happens when the tibia of the horse is fractured and held in place by the periosteum for days or weeks, without displacement, the fractured ends of the bone being held in apposition until complete reunion takes place.

An erroneous idea has prevailed among horsemen that fractured bones in the horse will not unite as quickly as the bones of

a man. They will unite more quickly, the great difficulty being to keep the animal quiet and the bones in proper position. The process of union and repair in the horse is very rapid and efficient, provided the solution of continuity does not extend into a joint having extensive motion.

THE SYMPTOMS OF FRACTURE.—When fracture occurs in one or more bones of a limb, the symptoms are great lameness suddenly manifested, obvious deformity, crepitation and inability to bear weight upon the limb. These are the general symptoms; the particular ones, as well as the causes of the several fractures, will be hereafter described and illustrated.

TREATMENT.—There are certain general rules applicable to such cases; generally speaking, if the animal be one of small value, we advise its destruction. On the other hand, if the animal be valuable, it should be treated. Compound fractures cannot be treated with any degree of success in the horse, especially those of the tibia and humerus, etc. Having decided that fracture is present, endeavor to bring the fractured ends of the bone into position as soon as possible. Having done this, splints must be applied in such a manner as to keep the parts at rest. This is accomplished by means of starch or plaster of Paris bandages, and by the use of slings. A starch bandage is simply factory cotton starched and applied around the parts. The best bandage, however, is formed of calico stiffened with plaster of Paris, care being taken to secure bandages of proper size, in width and length. They should be not less than thirty feet long and four inches wide. The bandage should be dipped into, or have poured upon it, plaster of Paris as it is being applied, which, on setting or becoming dry, forms a perfectly reliable and unyielding bandage, being, as it were, moulded to the parts and causing no undue irritation or feeling of discomfort. Nice, light splints may be used, such as strong leather, the pieces being made sufficiently long to extend to a distance beyond the superior and inferior articulations of the fractured bones, and broad enough to envelop and enclose the whole circumference of the

limb. Holes should be cut in the leather where the splints pass over any sharp eminence. There is a new kind of splint used in human practice, a kind of porous felt; this looks very nice and light, and, by immersing in hot water, it becomes perfectly pliable and will take the shape of the part; then applying cold water, it becomes solid. When swelling is present before the fracture is reduced, the splints may be maintained in position by the loop bandage, which consists of strips of calico about two or three inches broad, and long enough, when folded double, to pass around the limb, with a few inches of excess; one of the ends is then drawn through the loop and fastened to the other. This bandage is useful when the degree of tightness requires to be altered; but it must be replaced by the common roller, as soon as the swelling has subsided, and supplemented by one or two layers of bandage saturated with starch. We have used, with good results, a tarred cord carefully applied to the whole limb over the leather. The animal, if a horse, is to be kept in a state of quietude, in slings, for a period varying from two to three months. In foals, or unbroken horses, the slings must be dispensed with, the limb being set in the ordinary way and the colt being put in a comfortable box, bedded with sawdust, chaff, or short straw. When the bones of horned cattle are fractured, they must be treated in the same manner as those of the young horse, slings being as a rule inadmissible. The limbs of dogs, when broken, require nothing but a starch or plaster of Paris bandage; in the course of a very few weeks they will be found completely recovered. To prevent dogs from biting the bandage, it should be sprinkled with cayenne pepper before it sets.

Modes of Union.—The mode of union, as well as the length of time required in repair, depends to a great extent upon the bone fractured. An early consequence of fracture appears to be an exudation of lymph, which ultimately becomes firm, when it is called callus. The first eight or ten days blood is extravasated into the medullary canal between the fragments and under the periosteum; after a time sanguineous effusion is removed by

absorption. Between the tenth or twelfth to the twentieth or twenty-fifth day an exudation of lymph takes place, the reparative material being deposited between the fractured ends of the bone, and known as the callus. From the twentieth or twenty-fifth day to the thirtieth, fortieth, or sixtieth day the fibro-cartilage between the periosteum and the bone and that within the medullary canal are both converted into bone, the external forming a ring and the internal a plug, or peg, filling up the medullary canal, and together constituting the provisional callus. During the fifth and sixth months the callus increases in hardness, from day to day, until it is finally converted into bone, constituting the permanent callus. Extending from the fifth or sixth month to the tenth or twelfth, the provisional callus, being no longer necessary, disappears, and the medullary canal is restored. The reparative material makes the parts as strong, or stronger, than before fracture.

FRACTURE OF THE HUMERUS.

Fracture of the humerus is caused by falls, kicks, and severe injuries, such as are sustained sometimes in running away. We are of the opinion that perfect soundness cannot be restored in this fracture. The powerful muscles attached to this bone pull the fractured ends out of place, in spite of any appliance that can be used. A very young animal may be treated when the fracture is known as a simple one; but as a rule it is best to destroy the animal.

Symptoms.—The fractured ends are drawn past each other as in the cut. The limb is shortened, the inferior portion of the bone being drawn upwards by the muscles attached to it; great lameness; crepitus may or may not be well marked. It sometimes happens that humeral arteries are ruptured, causing great engorgement of this part of the limb, and rendering detection of crepitus an impossibility. The condyles of the humerus are occasionally fractured; as a rule, they never will unite, because

of the impossibility of keeping the parts in a state of complete rest.

Radius and Ulna.—The radius and ulna are fractured by direct violence, as the olecranon by muscular contraction. In dogs this fracture is not at all uncommon. The olecranon is fractured transversely by over-extension; it snaps across about its middle.

Symptoms.—There will be immediate and great lameness; the animal will stand with the whole limb in an exceedingly relaxed and semi-flexed condition with almost total inability to move it

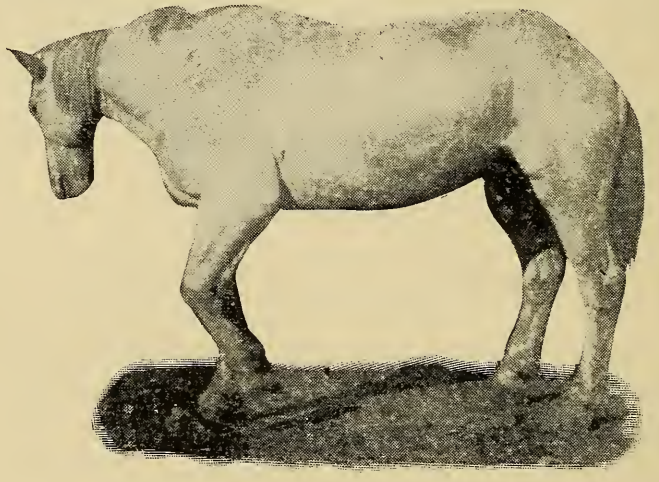


Fig. 27—Fracture of the Humerus.

or support any weight upon it. Owing to the immediate swelling it becomes a matter of great difficulty to form a correct diagnosis. Mr. Anderson, of Glasgow, has discovered an almost unfailing mode of diagnosing this fracture, as follows: Let the examiner place his knee firmly against the patient's injured leg; by firm pressure straighten the semi-flexed leg, and keep it in that position while an assistant is directed to lift up the horse's opposite forefoot. If the olecranon is fractured, the patient is unable to stand; but if there is merely laceration, he will be able to bear his weight with the assistance at the knee given by the examiner.

There are two positions in which the limb is maintained when suffering from this injury—namely, semi-flex, with the foot in advance, or semi-flex with the foot behind, knuckling over, the toe only touching the ground and turned inward.

Treatment.—Place in slings and bring the part, if possible, in proper position and bandage. When the process of caries or necrosis takes place, the diseased or detached fragments of bone are to be cut down upon and removed, but as a rule an animal receiving such a fracture should be destroyed. Fracture often takes place from the horse falling in the cart, the elbow being thrown across the shaft, and both the radius and ulna being broken through to the articulation. This lesion cannot be treated. The beak of the olecranon is sometimes broken; this cannot be cured. If the radius is broken in combination with the ulna it may be successfully treated.

FRACTURE OF THE KNEE.

Fracture of the knee is caused by kicks and falls, concussion, etc. As a rule, we do not treat such cases, but if the animal be valuable for breeding purposes, it is worth while to attempt treatment.

Symptoms.—There is extensive swelling, lameness, and crepitus may be detected.

Treatment.—Absolute rest; apply the plaster of Paris bandage and place in slings. After a few weeks' rest the animal may be gently exercised. This is necessary owing to the liability of anchylosis taking place.

FRACTURE OF THE SCAPULA.

The tubercle on the spine of the scapula sometimes becomes fractured, usually caused by injury, as external violence of any

kind. It is never caused by muscular contraction. Necrosis is the usual result of this fracture, and is manifested in the usual way by separation, etc.

TREATMENT.—Cut down upon and remove any detached or diseased portions of bone that may be found. *Fracture through the neck of the scapula* sometimes occurs, and may be caused in various ways.

SYMPTOMS.—The animal can hardly move the limb; perhaps goes on three legs, and there is crepitation.

Fig. 28—The Horse in Slings.

TREATMENT.—If the fracture be of the variety known as simple, it can be cured; but it will take a long time and a great deal of trouble. If the fracture extends into the articulation, the case is usually hopeless, the only chance being the exudation of material to cover it up; but little can be done beyond enjoining quietude, placing the animal in slings, and watching for untoward complications.

METACARPAL.

This fracture is easily diagnosed, and, if simple, can be successfully treated by using splints, bandages, slings, etc. The small metacarpals may be fractured and set up considerable irritation, but reunion will generally take place if the animal is kept quiet. There is no necessity of putting the animal in slings. This fracture may be caused by striking with the hind foot. In some cases crepitation may be detected.

SESAMOID BONES.

Fracture of the sesamoids occur from a violent sprain as in galloping in steeplechasing. In transverse fracture the symptoms are descent of the fetlock pad, elevation of the toe, with great lameness, and the presence of a depression, marking the seat of the fracture in the bone or bones. If the patient be a valuable animal for breeding it may be treated; if not, destroy the animal.

OS SUFFRAGINIS.

The os suffraginis is sometimes broken into many fragments, most mysteriously, while the animal is galloped on sandy or soft ground. This bone is frequently fractured. It is a common accident among race horses and hunters. The fracture is usually caused by concussion.

Symptoms.—Extreme lameness; there may or may not be crepitation. If it is a simple fracture it may be treated with success, but if compound or comminuted, it is best to destroy the animal.

OS CORONA.

The os corona is rarely fractured, but fracture may be produced in the same way as those given, and may be treated in the same way.

Os Pedis.—Fracture of the os pedis is caused by concussion, and occurs most frequently among running horses. The animal,

while running, suddenly falters and pulls dead lame. Soon there will be great heat around the coronet, and great pain manifested. The animal is unable to mark the limb. Nothing can be done except to rest the animal and endeavor to combat inflammation. It is frequently an act of mercy to destroy the animal.

NAVICULAR.

The navicular bone may be fractured in two ways—first, by direct puncture, as when a nail penetrates the frog; secondly, when it has been nearly worn through by caries or chronic navicular disease. Fracture of the navicular bone is hard to diagnose. The history of the case must be taken into account. When the bone is punctured by a nail, and broken, the discharge will be of a bloody nature, giving it a dirty red hue and fetid odor. When the fracture is caused by chronic navicular disease, the horse is generally found to have been lame for some time, but serviceable. All at once he becomes helplessly lame and unfit for further use. This form of fracture occurs very often after the operation of neurotomy, both tendon and bone giving way, and the fetlock coming to the ground. Inflammation and suppuration are the results ere reunion may take place.

BROKEN RIBS.

The causes are direct violence, such as kicks from other horses and blows. In simple fracture there are no symptoms presented and no treatment necessary. The compound fracture is the only kind that generally comes under our notice. The rib may penetrate the lung and cause pneumonia.

Treatment.—To find out whether the lung is punctured, and if the fragment or fragments of bone are displaced, and to replace them in their proper position. All this may be done by introducing the finger into the wound and by converting the compound into a simple fracture, closing the external opening by a good, stiff plaster—the Burgundy or common pitch will do very well. A broad bandage may be applied around the body.

If treated immediately after the accident, eight drachms of aloes may be used. If inflammation of the pulmonary organs has manifested itself, give sweet spirits of nitre, one ounce; nitrate of potash, three drachms, as a drench three times a day.

FRACTURE OF THE FEMUR.

The femur may be fractured through its neck or through its shaft; both forms are incurable. In both there is shortening of the limb, the toe being turned inward, except when the head of

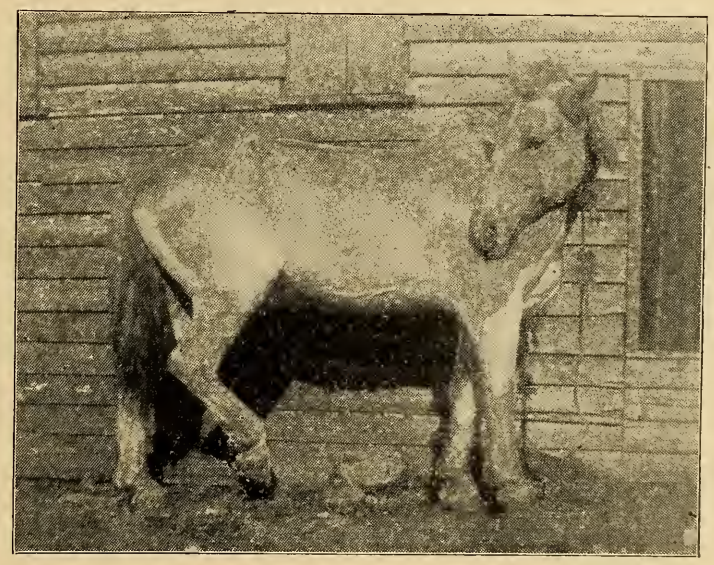


Fig. 29—Fracture of the Femur.

the femur is forced into the foramen oval, when the limb will be found longer than its fellow, and the toe will be turned outwards. Fractures of the trochanters may be treated. The symptoms of fracture of the trochanter minor externus are as follows: The commencement of the act of extending the foot is done easily, but the concluding part of the elevation of the limb is performed with great pain, causing a jerk when the limb is suddenly dropped; but when it has descended a very short way the pain is relieved. Fracture of the condyles cannot be treated.

PATELLA.

Fracture of this bone takes place, due to direct injury or muscular contraction; the fracture may be longitudinal or transverse. It cannot be treated with success unless it is a mere crack of the bone, with no displacement. A shoe with a high toe-piece and heel may be used and the animal placed in slings, and cooling applications being employed to reduce inflammation and swelling.

FRACTURE OF THE TIBIA.

Fracture of this bone takes place oftener than that of any other bone of the hind extremity. It is caused by direct injury, as kicks, and often occurs without displacement for several days.

Symptoms.—The animal stands with the limb flexed, throwing scarcely any weight upon it. When the parts are manipulated the animal evinces great pain. If such symptoms are present, the animal should be treated for fracture, the limb retained in position by means already described. If displacement has taken place, and the animal is aged, the best course will be to destroy it.

FRACTURE OF THE TARSAL AND METATARSAL BONES.

If the astragalus be fractured, there is little use in treating. The os calcis is transversely fractured by muscular contraction and by slipping forward of the limb.

Inspection will demonstrate a flatness of the point of the hock, with an apparent shortening of the limb. By manipulation the examiner will be enabled to detect the detached portion of bone. Lameness and swelling are present.

Treatment.—Place the animal in slings; apply a high-heeled shoe, then force the fragments into proper position, as nearly as possible, retaining it there by pads of tow and bandages. The tow should be made into firm pads and rolls, and pressed down in front and on both sides of the fragments to prevent it from

falling forwards. Over the dry bandage the starch bandage must be carefully laid, extending from the foot over the hock as high as possible, in order to keep the limb in a state of rigidity.

FRACTURE OF THE METATARSAL BONES.

The tarsal bones are all liable to be fractured by direct injury, and should be treated in the same manner as the similar bones of the fore extremity.

FRACTURES OF THE VERTEBRAE.

A fractured vertebra above the origin of the phrenic nerve, with displacement of its fragments, produces death. It is not discovered until a post mortem examination be made. The nerve being cut off, can no longer convey motor power to the diaphragm; the respiration grows slower and slower until it finally ceases altogether, death resulting solely from paralysis of this great respiratory muscle.

The transverse processes of the cervical vertebræ are sometimes fractured, and, by pressing upon the cervical nerve in the immediate neighborhood, cause more or less paralysis of the cervical muscles supplied by the nerve, producing what is commonly termed wry neck—that is, a twisted neck, the head being turned from the seat of injury. Fracture may occur by being halter-cast, getting the foot into the halter and struggling violently, getting under the manger, or other such injuries.

Symptoms.—There is a tendency to carry the head to one side; examination along the neck may find the seat of injury and detect crepitation. If you suspect a fracture, keep the animal as quiet as possible; bathe to allay the irritation and keep the feed-box pretty high; tie him up for several days. There are cases where reunion does not take place, causing necrosis of the parts; they become detached and set up irritation; there is a discharge; perhaps it heals up and then breaks out again. Cut down and remove the particle of bone.

The spinous processes of the dorsal vertebræ are the seat of

fracture; when this occurs, the detached fragments cause what is known as fistulous withers; the sinuses must be explored and the fragments removed. It is sometimes found that the tuberous ends of the spines are in a state of caries or necrosis from being bruised. The treatment for this kind of injury is the careful scraping away of the diseased surface.

DORSAL SPINE.

Fracture of the bodies of the dorsal spine give rise to what is known as broken back. A fracture of the dorsal spine is generally due to an ill-fitting saddle. Anchylosis of the dorsal vertebræ in old horses is manifested by a peculiar stiffness of the back, well shown when the animal turns around. On casting such a horse, fracture of the bodies of the vertebræ is very likely to occur, and will generally produce complete or partial paralysis. If the fractured part press upon the spinal cord, the animal will be unable to rise, and complete paralysis may occur. The animal shows no sign of feeling on being pricked with a pin. The hind legs may be moved about in any direction without any resistance by the animal. The fæces may be passed involuntarily.

Treatment.—If fracture of the superior spinous processes be present, the detached pieces of bone should be cut down upon and removed, and if the bone is found to be diseased it should be touched with diluted hydrochloric acid; if the bodies of the vertebra are fractured, as a rule, nothing can be done.

In the lumbar vertebra fractures occur in the same manner and present the same symptoms as in the dorsal region. If fracture occurs to the transverse processes, and the animal is kept quiet, reunion takes place quickly.

FRACTURE OF THE SACRUM.

Fracture of the transverse processes of the sacrum is caused by slipping, or by violent falls. Muscular contraction will also cause it.

Symptoms.—There is difficulty in moving. Before long it is

observed that the haunch falls to a certain extent; the highest part of the quarter becomes flattened. Examination per rectum will enable the practitioner easily to diagnose the exact seat of the injury.

Treatment.—Slings and rest; as a rule cases terminate very satisfactorily, leaving only the flatness of the quarter.

The coccygeal are also liable to fracture, which may be detected by inability of the animal to raise the tail, difficulty in defæcation, and by crepitation.

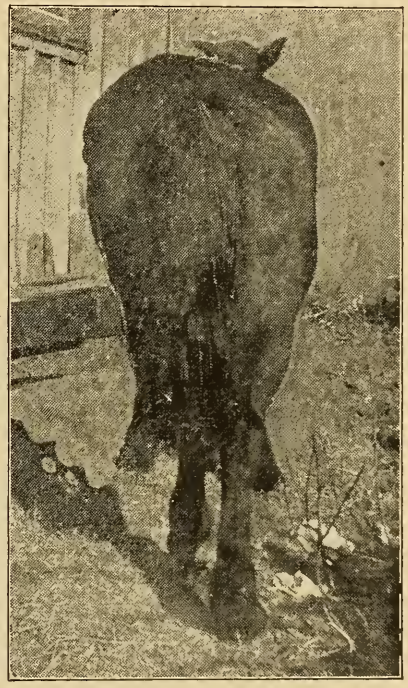


Fig. 30—Fracture of the Sacrum.

Treatment.—Strong leather binding laced around the tail, extending from its upper to its lower part, proper padding being at the same time used to prevent excoriation.

The rudimentary spines of the false vertebræ of the tail are sometimes fractured, giving rise to troublesome sinuses. The treatment will be to lay open the wounds and remove the detached bone.

A comminuted fracture of the bones of the tail, with violent bruising of the soft parts and gangrene, is occasionally seen. In such amputation of the tail and removal of all of the fractured bones must at once be resorted to or serious consequences may result, such as irritative fever and tetanus.

FRACTURE OF THE PELVIC BONE.

Ilium.—Fracture of the supero-anterior spine of the ilium is one of the most common accidents of horse flesh. It is usually produced by running through a doorway or other narrow place

and striking the part against the door frame. It may also be caused by falls.

Symptoms.—There is lameness and lateral flatness of the quarter. The broken piece of bone is drawn inward and downward by the action of the abdominal muscles attached to it. In this fracture we find that the method of repair is by false joint. Very little treatment necessary in a case of this kind. If the soft parts are injured, purgative, fomentation, and a short rest will be sufficient. If the animal is not kept quiet, caries or necrosis may set in, rendering it necessary to open up the parts and remove any diseased or detached portions of bone that may be found.

Fig. 31—Fracture of the Anterior Spine of the Ilium.

FRACTURE OF THE ILIUM.

Fracture of the dorsum of the ilium is generally due to muscular contraction. There is falling of the haunch and swelling. The animal is to be kept as quiet as possible; use slings, fomentations, plasters, and chargers.

Fracture through the shaft of the ilium is common, and is caused by slipping, falling, etc. There is difficulty in bringing the limb forward, which has suddenly slipped. Examination per rectum may detect crepitus. The prognosis is usually favorable, especially if the patient be young and strong.

Ischium.—The shaft of the ischium is the portion most liable to fracture, and the fracture generally passes through the foramen ovale. It is caused by slipping, falling, etc. There is difficulty in progression, descension of the haunch to a certain extent, and crepitus.

Fracture Through the Symphysis Pubis.—This form of fracture is caused by the posterior extremities suddenly slipping outwards. Its symptoms are a wide, straddling gait behind, the legs being dragged forward in progression; the feet wide apart, the toes turned outward. Examine per rectum.

Very little can be done in the way of treatment. If the animal is not of much value, he had better be destroyed; but if young he may be treated. Place in slings, pull the limbs as near to each other as possible, and keep in that position by fastening with a strap above the hocks. In two or three months a fair recovery may be expected.

Fracture of the tuberosity of the ischium is caused by falling upon the buttocks, either from slipping or falling. The symptoms are flatness of the most rounded part of the quarter, crepitus in manipulation, swelling of the soft parts, lameness. All that needs be done is to apply a good, stiff charge or plaster after the subsidence of the swelling and keep quiet.

When fracture of the acetabulum occurs, the case is a hopeless one. It is caused by kicks, falls, blows, and by muscular contraction. The limb can scarcely be moved at all, the foot rests upon the toe, or is not placed to the ground at all; the limb is shorter than its fellow. There is great pain and crepitus.

INFERIOR MAXILLA.

Falling may fracture either the inferior or pre-maxilla. The direction of the fracture is longitudinal, involving the alveolar cavities of the incisor teeth, and terminating in the maxillary space, or obliquely from the center outwards, through the neck of one or both rami.

Treatment.—Remove loose teeth and bone, bring the parts in position, and secure by means of copper wire, bound firmly around the incisor teeth. If the animal be a male the tushes may be included in the wire. Apply a calico bandage, and support the patient with liquid food for several days, fed from a shallow vessel. Recovery takes place in a very short time.

Lower Jaw.—The lower jaw is often injured by the bit, especially if a powerful curb bit is used and the animal hard to restrain. There will be a dribbling of saliva, swelling of the mucous membrane, and pain. The animal shies when the mouth is touched; difficult mastication; perhaps hemorrhage from the mouth.

Treatment.—Remove the diseased bones, feed on soft diet, and clean the wound occasionally. If the wound is discharging fetid material, a solution of carbolic acid should be used.

Fracture of the rami of the lower jaw is generally caused by falling. Mastication is rendered difficult, or even impossible. There will be swelling and crepitation. When the broken ends of the bone are brought together, means to retain them in their proper position must be resorted to. The copper wire and bandages already referred to may be used; but if the fracture is situated posterior to the tush, something more than this is required. A good apparatus for holding the bones together is the face cradle recommended by Professor Varnell, of London. It is a very good apparatus, but not always easy of access. But we must not despair if we do not possess any other splints than such as may be made at the time. Thin strips of bass-wood acted upon by water and applied to the parts do very well; gutta percha may be moulded to the parts after they have been brought together. The animal should be supported on liquid foods, and the case watched to see that reunion takes place in the proper manner.

NASAL BONES.

This fracture occurs rather frequently from runaway horses coming in contact with hard substances, such as lamp-posts, tele-

graph poles, etc. One or both bones may be fractured. Sometimes the bones are driven into the nasal sinuses, and more or less hemorrhage ensues. Bring the bones into position and apply an adhesive plaster over the whole fractured surface. If the bones are driven in, wrap a chamois skin or piece of selvyt around a probe and press the bones into position, care being taken to remove all detached pieces of bone. If they do not remain in position, one nostril must be plugged.

FRONTAL BONES.

Fracture of the frontal bones takes place from causes similar to those of the nasal bones, and is generally of the variety known as comminuted. The symptoms are a raising and lowering of the bones at each inspiration and expiration, hemorrhage, etc. The treatment requires the adhesive plaster, the removing of the detached pieces of bone, etc. It is best sometimes to wait a few days before moving the diseased bones.

ORBITAL PROCESS.

This is fractured by external violence, and sometimes produces opacity of the cornea. Bring the bones into position, apply plasters, and remove the small portions of detached bone.

Fracture of the internal plate of the frontal bone is caused by external violence. In receiving the injury the animal usually falls to the ground, remains down for a few minutes, then gets up and appears all right, but in a few days brain symptoms are presented.

Treatment.—Keep the patient quiet and endeavor to raise the bone. Use cooling food and cold applications to the seat of injury. The prognosis is unfavorable.

PARIETAL.

Fracture of the parietal bones occasionally occurs, and death results. The operation of trephining and removing the piece of

bone that is pressing upon the brain is not attended with as much success in veterinary patients as it is in human practice. Wherever there is evidence that a bone is pressing upon the brain we should cut down, trephine, and remove it if necessary. This operation should be left to a surgeon.

X.

DISEASES OF THE BONES.

Diseases of the bones are classed under two heads—inflammatory and non-inflammatory—but the line of demarcation is not very well defined. The process of inflammation takes place in bone the same as in soft tissues. On making a section of a bone compact and cancellated tissue is found. The compact tissue contains the Haversian canals, conveying blood plasma to the lacunæ. In this manner this portion of the bone receives its supply of nutritious material from the blood; without this arrangement the bony structure could not receive nutrition. It will be seen that the compact bone is abundantly provided with vessels, entering from numerous points, covered by periosteum and endosteum; that these nutrient vessels are exceedingly small; in consequence of this the inflammatory process is very distinct and the symptoms very acute. Inflammation of the substance of the bone is termed ostitis. Superficial ostitis is often associated with periostitis, or inflammation of the periosteum. In fact, the bone and periosteum are so closely related that inflammation of the one will involve the other. The first effect of inflammation is to increase the size of the Haversian canals, which become more irregular in size and outline. The earthy salts are partially removed, and their place is filled by the products of inflammation. An external swelling makes its appearance; the vessels of the periosteum and soft parts becoming involved, throw out a deposit upon the surface of the bone. This exudate, as a rule, becomes converted into bone, leaving the parts permanently altered in shape and appearance, or it may become absorbed before it is ossified and the parts regain their former condition. When ossific matter is thrown out it is called exostosis, meaning bony deposit, as splint, spavins, sore shins, etc. This exudate is at first

of a gelatinous condition, forming a coagulum like the white of an egg; then it becomes a soft, flexible cartilage, and ultimately forms bone.

Inflammation may be excited by many causes, but the most prolific cause is injury, either direct or indirect. It is also produced by constitutional tendency. In joints the articular cartilages are often destroyed by inflammation, and osseous material is thrown out, producing anchylosis, which means a union of the bones composing the joint; a stiff or completely immovable joint is the result.

OSTITIS AND PERIOSTITIS OF THE METACARPAL BONES, OR SORE SHINS.

This disease affects the anterior surface of the metacarpal bones of young animals. It is more commonly seen in young race horses, under four years old, and is due to the fact that they are called upon to perform an amount of work at an age when they are totally unable to endure the shocks of concussion risked by such work. The leg with which the animal leads in the gallop is more frequently affected, though both legs may be affected. The whole shaft of the bone may be affected, and this may be so excessive as to cause necrosis, but it is usually circumscribed and confined to the lower extremities.

Symptoms.—Lameness occurring after a gallop; slight at first; the horse is rested by the shifting of the legs, pointing the foot, if only one is affected; fever, increased respiration, swelling, pain upon pressure. The swelling is doughy to the touch, depending on the thickening of the periosteum and on the presence of the subperiosteal exudate.

Active treatment must be employed in order to prevent necrosis. If of an acute nature, free subcutaneous incisions through the periosteum should be employed; this will relieve pain and cut short the disease. In addition to this warm and soothing fomentation should be used, succeeded by cold, and afterwards by a liniment composed of equal parts of ammonia, turpentine, and

linseed oil, or one part of biniodid of mercury to four or five parts of lard may be used. Keep it on for a day or two and wash off, repeating, if necessary, in a few days.

SPLINTS.

This is another form of ostitis and periostitis, affecting the metacarpal bones, and in rare instances the metatarsals. It is usually situated about the lower portion of the upper third of the bone and on the inner side. A splint, when not causing lameness, and in a position removed from either articulation or tendon, is not looked upon as an unsoundness; all other forms are unsound. The causes of splints are concussion and hereditary predisposition, more especially that arising from shape and form of leg, which descends from parent to offspring. Splints are generally found in horses newly put to work and in the road horse or lighter breeds. They do not always produce lameness. If of the simple kind, lameness is but seldom seen, and when about seven years of age the enlargement disappears, although the deposit may have been of considerable size.

Fig. 32—Splints.

Symptoms.—Lameness may precede the appearance of any swelling or deposit. If the horse walks sound and drops deci-

dedly in the trot on the sound limb, manipulate the parts to detect a deposit. Concussion applied will increase lameness, as will continued use. Tap on the parts and he will flinch; trot him immediately afterwards, and the lameness is increased.

Treatment.—Unless the splint is actually producing lameness, it should be let alone, except where it is of great size, causing an "eye sore." It may be cut down upon and the enlargement removed by the bone spoon. In all cases a purgative must be used; give eight drachms of aloes. Apply cold water freely for an hour at a time, and use the unguentum hydrarg. biniodid, one to four ounces, or the ungt. cantharides, one to four, may be used. The hair is to be clipped off the part and the ointment applied with friction. Several applications may be required. A seton passed over the splint, and allowed to remain several weeks, is an excellent remedy. It may be necessary in some cases to fire. After heating the iron, pass the point right into the osseous enlargement. Periosteotomy is often attended with good results. The operation is very simple, and consists of making an incision through the skin. Through the opening thus made the periosteotomy knife is inserted, and the periosteum covering the splint is incised and pressure is relieved. Such operations should be performed by a surgeon. The above described ointment will soon remove all lameness, and should be used in preference to the operations.

SCROFULOUS OSTITIS.

Scrofulous ostitis is found in all young animals of a few days or weeks old.

Causes.—Scrofulous ostitis is caused by an insufficient supply of mother milk to the young animal—long fasting, as in cases where the mother is put to work soon after the birth of the foal, and allowed to suckle her young only two or three times a day. It may be due also to a naturally weak constitution, or in rearing the foal on cow's milk. Foals gotten by horses that serve a large number of mares often suffer from this disease.

Symptoms.—The first symptom is a dribbling of urine from the umbilical cord. The patient will be still lame in one or more joints; the affected parts are swollen, hot and tender; the respiration is hurried, the joints enlarge and suppurate, and the discharge is complicated with open joint; abscesses form on various parts of the body, the patient loses flesh, is unable to rise, and dies a miserable death.

Treatment.—It may possibly be overcome in some cases. The system should be toned up. Attention must be paid to the state of the digestive organs. Four ounces of castor oil, with two drachms of carbonate of soda, may be given; lime water may be used in the milk. Care must be taken to see that the patient suckles its mother sufficiently often, and if he be unable to stand, he must be lifted up. The mother must rest from work and be supplied with good food. If she has not sufficient milk, the deficiency must be supplied with cow's milk. The patient should be kept quiet, and the parts gently stimulated, etc.

CARIES.

Caries is an ulceration, or death of bone in small particles. Caries may, or may not, be accompanied by a discharge. As a rule, when there is ulceration of bone, with a discharge of pus, it is the result of external injury; there is actual death of a layer of bone. The discharge is very offensive, due to the presence of sulphureted hydrogen. On going to the bottom of a sinus the presence of a carious bone may be at once detected by the sense of touch.

Caries commences in the interior of a bone and makes its way outward; the bones acquire a red hue, the articular surface becoming soft; the laminal layer and articular cartilage are removed, exposing the cancellated structure, from which vascular processes shoot out in the form of red teat-like granulations; the surface of the opposing bone, forming the articulation, becomes similarly diseased, the granulations from the one bone coalesce with those from the other and form a vascular connection be-

tween the interior of both bones. In this manner the process of an anchylosis is commenced.

TREATMENT.—Cut down upon and expose the diseased structure; scrape the diseased bone until all carious portions are removed. Where extensive disease exists, scraping with the bone-spoon will rarely suffice. In such case a portion of bone must be removed by means of the bone forceps or bone saw, after which the parts may be touched with diluted hydrochloric acid. If the presence of caries in an articulation be suspected, the treatment should, of course, be different. If it exists in a true hock joint, a cure cannot be effected, but if in a gliding articulation the treatment consists in hastening the process of anchylosis. Give rest and use the actual cautery. Red iodide of mercury, one part of lard to five parts of mercury, may be used.

NECROSIS.

Definition is death of bone. It corresponds to mortification of the soft structures, and is distinct from caries, as mortification is from ulceration. Necrosis is due in a large majority of cases to injury, either directly or indirectly received, and is very rarely due to constitutional disturbance. The necrosed portion presents a white, waxy appearance, sonorous when struck by a probe; exposed to the atmosphere, before separation, it becomes changed in color. If the skin should be uncut, an abscess soon forms, which, if left alone, discharges itself; if the ulcer is examined with a probe, the bone will be found bare and perhaps loose. The abscess does not heal until the loose portion, called an exfoliation, is removed; in fact, there is now a fistulous communication between the dead bone and the atmosphere.

Free vent must be given to the pus, which is curdy in consistence, and when the bone is found to be loose should be removed by the forceps.

Necrosis is often seen in connection with the lower jaw. It sometimes affects the shafts of the long bones, more especially the metacarpals, metatarsals, and scapula.

Symptoms.—Swelling. After awhile there is a discharge from the affected part, and an abscess is formed, at which time the dead bone is separating from the living. There is a discharge of curdy pus with fetid odor. The wound does not heal.

Treatment.—Enlarge the opening from which the pus is flowing, and with the fingers or forceps remove the dead portion of bone.

The same treatment will apply to necrosis wherever found. If it occurs in the weight-bearing bones, the treatment is more tedious. The animal should be properly cared for by having good food, comfort, and cleanliness.

ABSCESS OF BONE.

The formation of abscess in the substance of a bone is of rare occurrence. In long-continued cases of lameness, with enlargement of a bone, a surgeon should open the enlarged portion by a trephine, the probabilities being that he will find pus. It is generally necessary to cast the patient, make a careful incision on the diseased bone, avoiding injury to important blood vessels and nerves, dividing of their long axis, separating all the soft tissues from the bone before the trephine is applied, and finally washing out the abscess with water, in which a small quantity of pure carbolic acid has been dissolved.

RICKETS.

The term rickets is used to denote an unnatural softness of the osseous system in young animals. It is due to a deficiency of earthy, and an excess of animal, material in the bone. Rickets may be seen in foals, calves, and young dogs, more especially young spaniels and pointers. In foals and calves the metacarpal bones are those which bend first; in dogs, the lower third of the humerus, giving to the dog a dwarf-like appearance. When the bones of the posterior extremities are affected, the toes are turned outward, the hocks inward.

Rickets appear when the patient is a few weeks or months old,

caused by constitutional debility, scrofulous diathesis, or by external and preventible causes. Thus we find it in calves which are not allowed to suckle their mothers; in foals when mothers are taken to work during the day and their offspring allowed to suckle perhaps every morning and night, or at most three times a day; young animals fed on artificial food in time of milk and kept without exercise.

Treatment.—The treatment must be both local and constitutional; to be successful it must be energetic and persevering, regardless of trouble until a cure is affected, or it becomes plain that the case cannot be treated successfully. If the milk of the mother is suspected, this may be remedied by changing or increasing her food, and giving her alteratives and tonics. The mother should take three drachms of sulphate of iron, powdered gentian, three drachms, in the feed night and morning. If the bowels are irregular, six drachms of aloes should be administered; if acidity of the stomach be present, lime water and linseed oil, or castor oil, may be used. The limbs should be supported by sticking a strong piece of canvas around a strong splint and lacing it around the limb. Care should be taken that the splint does not chafe the limb in any way. The splint of wood should be applied to the concave aspect of the curve, taking care that it is of sufficient length to reach the unbent portions of the limbs, both above and below curves. Keep the patient in a nice, level paddock, and give food that tends to make bone, as bones to a dog and oatmeal to foals.

MOLLITIES OSSIUM.

Definition.—An abnormal softening of bone, due to the presence of a largely preponderating quantity of animal matter and a correspondingly small amount of earthy material within the bone substance.

Symptoms.—There may be observed difficulty in mastication, which gradually becomes well marked as the disease progresses. The bones become enlarged and take on a soft and cartilaginous

character; there may also be a discharge which is usually profuse and of a very offensive character.

Treatment.—There is no means known by which a cure can be effected.

FRAGILITAS OSSIUM

Is an unnatural, hard, and fragile condition of the bones, due to fatty degeneration of the animal basis and to the presence of an undue quantity of earthy material.

Symptoms.—The disease chiefly affects old horses. Bad thrivers, with small articulations, badly-formed hocks and knees, and round pasterns, are subject to it. The animal moves stiffly and may have a roached back; he shows a tendency to ring-bone, spavin, etc. When down, he has difficulty in getting up. If such an animal be cast, or fall, fracture of some of the bones is an almost sure result.

Treatment.—Like the previous condition, it is incurable and useless to treat.

OSTEO POROSIS.

This is a non-malignant disease of bone and of a non-inflammatory type. It is commonly known as "big-head." It consists of a porous condition of the bone, which is increased in size without proportional increase in weight. It prevails most extensively in the great valley of the Mississippi, in the States of Tennessee, Arkansas, Mississippi, Louisiana, and Alabama. As we recede from the great river and its influences, it gradually diminishes, yet isolated cases may be found throughout the country, from the Atlantic to the plains of the far west, and from the Ohio and the Potomac to the Gulf of Mexico.

As a rule, the bones of the face are the first to suffer; but this is liable to exceptions. The animal in most instances shows a defective action, perhaps, in one joint or limb only, in which, upon examination, tenderness will be evinced with heat, and in a few days visible enlargement. In a course of a week another limb may become affected in the same way, when the acute symptoms

of the first attack perhaps have partially passed off. In this way all four extremities, one after the other, eventually become diseased. On being led out of the stable the animal steps short, flexes his limbs with difficulty and apparently with much pain; the joints are hotter than natural, slightly swollen, and tender when pressed upon. On turning the horse around or moving him in a backward direction, a decidedly rigid state of the loins is observed, and usually pain is evinced by pressing upon the back. On examining the head, the facial region will look round. Each ramus of the lower jaw, upper maxillary and nasal bones are usually enlarged, and pressure upon them causes pain. The mucous membrane of the mouth, the nasal chamber, and chambers of the eyes are paler than natural.

Fig. 33—Osteo Porosis, or Big Head.

Osteoporosis, in symptoms and pathology, is closely related to rheumatoid arthritis and fatty degeneration of the bones. The disease is no doubt due to the same cause that produces rheumatism of the joints. The various chemical changes of the bones, termed disease, are no doubt due to one and the same cause. They received their name from chemical changes presented at certain stages of the disease; hence the disease is first rheumatoid arthritis, or rheumatism of the articular joints, and later we have softening of the bone and enlargement of the head,

known as osteo porosis. This disease is essentially a disease of growth, and in this particular it resembles rickets. It is seldom seen in horses over twelve years of age.

Causes.—The causes producing this disease have been a mystery. It prevails most extensively in low-lying lands and in damp places. All classes of horses, mules, ponies, sheep, and cattle, no matter how fed and treated, get the disease in certain localities and under certain conditions. I have been unable,

Fig. 34—Osteo Porosis.
Side view. The dotted lines show the enlargement.

after thorough investigation, to trace the cause of the disease to feed. The water and feed may be predisposing causes, but they will not produce the disease in themselves. The symptoms are more aggravated during the winter months, and the disease is more prevalent where stables are located on low, marshy land.

For the last five years the disease has prevailed to a considerable extent at Lambert's Point, Virginia. This point of land lies on the Elizabeth River, only a few miles from Hampton Roads. With but few exceptions the farms on this point have

had cases presenting symptoms of rheumatism. On one farm every young horse brought there has become similarly diseased. Out of twenty-one cases presenting symptoms of rheumatism, that came under my observation in this locality, only seven developed big-head. Some of this number were treated three and four years ago, and are now well. Some that were not able to stand without the aid of slings have made good recovery, and never showed enlargement of the bones of the head. It is first noticed from lifting the foot in pain, while standing in the stable; later there will be lameness in one or more joints, shifting from one joint to the other, and ultimately there will be enlargement of the head. This period may extend over a year. Those cases with big-head yielded to treatment as readily as others that showed no enlargement of the head.

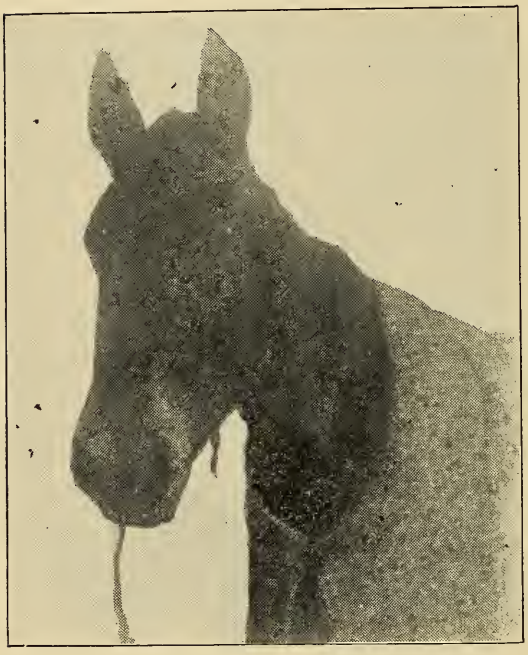


Fig. 35—Osteo Porosis.

One case, that had big-head, had shown symptoms of lameness of the joints for some time, and was not treated. During the night, and while in her box stall, there was rupture of the internal lateral and capsular ligament of the knee joint. She was destroyed, and the post-mortem revealed the following condition of parts: From the upper part of the cannon bone its periosteum was removed, and the bone was darkened with small detached pieces. The periosteum of the long bones near the joints could be easily removed. The long bones were not soft; they were firm enough externally, but on section were found to be thinner than normal. The cartilage of some of the joints was

partially removed, while others appeared normal. The cartilage of the hip joint was pale yellow in color. The quantity of synovia in the joints was small. This same condition exists in rheumatoid arthritis. Several small growths were found in the joints, some cartilaginous and others bony in their character. This condition is also present in rheumatoid arthritis.

The bones of the jaw were considerably hypertrophied and of a pink color. The periosteum could be scraped off with ease. On pressing upon the bone, blood would ooze from its surface. The bones here were soft.

Treatment.—The treatment of the cases above mentioned consisted of six drachms of aloes every third or fourth day. Nitrate of potash in one-half-ounce doses should be given in the feed three times a day. Drachm doses of salicylate of soda should be given in the feed, along with the potash, night and morning. Nitrous æther in ounce doses might be added to the first three or four doses.

The local treatment consists of liniments to the affected parts. The animal should be put to slow work.

OSTEO SARCOMA.

This is a non-inflammatory disease of bone, and is defined to be a fibro-plastic degeneration of bone. It is a disease of a malignant character, and is seen often in the finer bred cattle, especially in the duchess strains.

The cause of this disease has been attributed to external violence in some cases, but I am inclined to believe that all cases of osteo sarcoma are due to a vegetable parasite. The parasite causing the disease is known by the name actinomyces. The parasite gets into the mucous membrane in connection with the teeth. "Prof. Williams states that he is of the opinion that the causes are intrinsic and due to a scrofulous diathesis." It occurs in young animals mostly, and affects steers more than bulls.

Symptoms.—The disease occurs oftenest in the lower jaw. A small tumor or circumscribed swelling occurs in the neighbor-

hood of the second or third molar teeth; the teeth generally, after a time, become loose and fall out. At first the animal experiences no inconvenience; indeed, it seems to suffer but little throughout the various stages of the disease, provided the teeth do not become carious. If this occur, the sufferings of the animal will be severe, and it will lose flesh from inability to feed.

TREATMENT.—If taken in time the disease can be cured. If, however, the tumor has attained a considerable magnitude, the animal should be prepared for market. The injury does not affect the quality of the meat for food. In some cases a surgical operation may be necessary. The skin must be dissected from the tumor, and the tumor and the diseased portion of the bone removed; after which scrape with the bone spoon and apply carbolic acid, one part of acid to four parts of oil.

XI.

DISEASES OF JOINTS.

The diseases of the joints are numerous and important, more especially when their varied activity is taken into consideration. Joints consist of bones, articular cartilage, synovial membrane, capsular and binding ligaments, fat, blood vessels, and nerves. They are divided into three classes—the immovable, the movable, and the mixed. It is only with the two latter classes that we have to deal. The mixed joints are simply joined together by powerful binding ligaments, the end of the bones being padded with fibro-cartilage. This simple kind of articulation is subject to but one form of disease, chronic inflammation, causing the gradual conversion of the fibro-cartilaginous pad into bony tissue. In this manner the vertebral column of the dorsal region is converted into an unyielding structure, impairing the natural movements of the horse.

Cause.—It is caused by placing too great weight upon the back, and by a constitutional diathesis. The bones degenerate, becoming fragile and liable to fracture from trivial causes.

Symptoms.—The symptoms of this disease are very obscure; some slight stiffness about the loins may be observed. There will be disinclination to lie down, with more or less shivering. Cart horses are affected more frequently than any other class, but it is sometimes seen in hunters and hack horses. Horses suffering with this disease occasionally present symptoms of partial paralysis; there will be an uncertain gait, crossing the hind legs, and reeling. There will be great difficulty in backing, accompanied with a peculiar and sudden quivering elevation of the tail.

Treatment.—Rest the animal and give eight drachms of aloes. Drachm doses of the tincture of belladonna may be given

three times a day. The local treatment will consist of fomentation to the loins and the application, three times a day, of equal parts of ammonia, turpentine, and linseed oil. A blister made by mixing one part of powdered cantharides to six of lard may be used with advantage in some cases. It should be applied, about four inches wide by about eighteen inches long, to the dorsal spine or to the spine that is affected. It should be washed off at the end of twenty-four hours and the parts greased with lard.

The diathrodial or true joints are divided into three varieties—namely, gliding joints, ball and socket joints, and the hinged joints. The gliding joints are liable to inflammation and ulceration of the articular surface. The bones of these joints are covered by cartilage of incrustation and the cavity lubricated by synovia. The enarthrodia, or ball and socket joints, are in the lower animals seldom diseased, and when they do become diseased, it is generally from a rheumatoid or tubercular diathesis. The ginglymoid, or hinged, joints are injured from without, and produce an acute and chronic inflammation of the synovial membrane, destruction of the articular cartilage, caries, and a calcarious deposit. There will be a defective secretion of synovia, a dropsical condition of the articulation, and anchylosis.

INFLAMMATION OF THE SYNOVIAL MEMBRANE, OR ACUTE SYNOVITIS.

Any true joint in the body may suffer from inflammation of its synovial membrane, but some are more liable than others. In acute synovitis the membrane is congested. Its surface becomes dark red or crimson colored. Its secretion is checked, and later there will be a superabundant secretion of unhealthy synovia, aqueous in its character, and containing flakes of lymph. This exudation of lymph is confined to the synovial surface, and does not extend to the articular cartilage. In severe cases suppuration may take place, and if the disease is not arrested ulceration of the cartilage is sure to follow.

Cause.—Strains, punctures, rheumatic poison, deposits of

tubercular matter, and deposition, in and around the joints, of mineral poison, as seen in horses employed in smelting works.

Symptoms.—Lameness and fever. The pulse will be quick and irritable, sweats bedew the body, and the lameness is so great that the animal cannot put its foot to the ground. The affected joint soon swells, becoming more tense in the later stages. There will be increased heat and tenderness.

Treatment.—Every means should be employed to arrest the disease before the cartilage becomes involved, or it will be incurable. If it is in the hock, the animal should be placed in slings. Long continued and repeated fomentations should be applied to the part, and a weak solution of opium or aconite applied to soothe the parts. Give six ounces of aloes, and, if the pain be severe, give a dose three times a day of an ounce of tincture of opium. If the pain is less acute, one ounce of nitrous æther may be given twice a day. Three drachms of nitrate of potas. should be dissolved in his drinking water morning and night. If the pulse be hard, twenty drops of aconite may be used. If these remedies fail to give relief in the course of a few days, a blister should be applied. If any lameness or thickening of the joint threatens to remain, it may be necessary to apply the actual cautery.

CHRONIC SCROFULOUS SYNOVITIS.

This disease is confined to horned cattle. The joints most usually affected are the elbow and stifle and the foot joints in cattle. It attacks animals of all ages, but generally after they are three years old.

Symptoms.—Lameness without swelling, but later swelling may appear. The swelling gradually enlarges, and the limb below it wastes away. In some cases constitutional symptoms of scrofula may be seen at the outset of the disease. Scrofula is hereditary, and on its appearance in a herd it will be high time to infuse new blood into it.

Treatment.—The treatment can be but palliative. There is no cure.

RHEUMATOID ARTHRITIS.

This condition of the synovial membrane is probably due to the peculiar inflammation which has been termed rheumatic gout, or chronic rheumatic arthritis. The disease may be a constitutional or local disorder; the constitutional, originating from exposure to cold when the body has been over-heated, or as a sequel to rheumatic fever; the local, from over-exertion or accident.

Symptoms.—There will be a singular rigidity in the affected joints, which, when first moved, emit a crackling sound. In some cases there may be painful spasms of the muscles. There will be swelling around the affected joints, which are painful and tender to the touch. The synovial bursæ in connection with the affected joints is frequently found distended, and synovial cysts become developed in the areola tissue, having no communication with the joint. The fluid in the cysts finally becomes absorbed and converted into solid tumors.

Treatment.—The treatment can, generally, only be palliative, and is chiefly constitutional. Nitrate of potash in three-drachm doses may be given. Salicylate of soda has been used with good results in some cases. The bowels should be regulated by an occasional purgative, the animal carefully fed and put to slow, light work. The patient should be kept in a comfortable, dry box, and a liniment, composed of equal parts of ammonia, turpentine, and linseed oil, should be applied three or four times a day to the diseased joints.

TRAUMATIC INFLAMMATION OF JOINTS.

An open joint, when occasioned by puncture or incision, is not at first attended with severe local or constitutional disturbance, but in about ten days pain comes on and spreads over the joint, which soon presents a considerable amount of swelling. The swelling soon becomes hard and unyielding, accompanied by great constitutional disturbance; the pulse is frequent, hard and

wiry, sweats bedew the body, and the animal evinces acute and agonizing pain. The animal cannot put the foot to the ground, keeping it almost continually in a state of motion. The discharge of synovia may be very trifling for some days after the accident, but it generally increases as the inflammation advances, is thin in consistency and mixed with flakes of lymph. The secretion from the wound finally becomes unhealthy and tinged with blood, while abscesses begin to form around the articulation. The fever and debility increases, and if not arrested the animal dies.

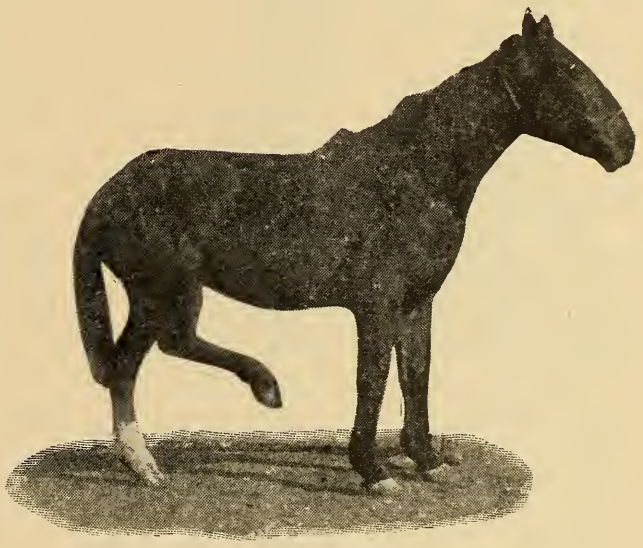


Fig. 36—Open Joint.

Treatment.—An effort should first be made to promote the healing of the wound by first intention. The lips of the wound should be brought together by sutures. All foreign bodies, such as dirt, gravel, or detached tissue, should be removed. A thin paste of spirit varnish and iodoform must be applied, being painted on in successive layers. Next, place the animal in slings. All other local applications should be withheld.

Give six drachms of aloes, to be followed at intervals of four to six hours by half-ounce doses of tincture of opium or twenty drops of the tincture of aconite, and enemas of warm water will be beneficial. If after the wound heals an inflammation still exists, cold water should be applied in great abundance. If this plan of treatment does not seem to succeed, a blister must be used.

If inflammation has already established itself and pus has commenced to form, the wound should not be plugged. If plug-

ged, the fluid would burst out at some other place. The wound should be irrigated with a solution of corrosive sublimate, one to five hundred parts of water, to destroy all germs that may have gained entrance, and bandaged. If the bandage causes no inconvenience, it should be allowed to remain until the wound heals. Experience warrants me in recommending a blister applied to the whole surface of the joint. The coagulum of synovia which accumulates upon the wound should never be removed, as it prevents the admission of air and germs to the wound. If the pus is of a sanious or fetid character, the best results to be hoped for is anchylosis, which renders the animal unfit for further use. All cases of open joint require a long period of rest after the wound has healed, and it is generally necessary to blister repeatedly, or even fire, to remove the inflammation. The food should be spare, light, and cooling; but when the fever has abated it should be more nourishing.

DROPSY OF THE JOINT, OR HYDROPS ARTICULORUM.

This disease is a morbid condition, with or without inflammation, as in bog spavin and its analogues, termed wind galls. In this affection there is an over-abundance of serous synovia, which distends the whole joint or bursæ. There is generally not much lameness. The quantity of secretion varies, disappearing and reappearing on exercise or rest. Young growing cart horses show these fluid enlargements about the hocks.

The treatment is the application of blisters and pressure, but this will be again referred to in another chapter.

ANCHYLOSIS, OR THE STIFFENING OF JOINTS.

There are four forms of anchylosis—osseous, true fibrous, ligamentous, and spurious. True anchylosis is complete at every part of the joint, as in some ringbones and spavins. All trace of the articulation is lost, and the bones so firmly united as to appear as one bone. An ulcerative absorption takes place in the

bone, and an exudate is thrown out, which, becoming organized into bony matter, cements the bones together. The natural termination and cure for bone lameness, such as ringbone and spavins, is anchylosis. The fibrous form of anchylosis is where the surface of the opposing bones are united by fibrous tissue. The ligamentous form causes the joint to be stiff and immovable, whilst the articular surface of the bones remains healthy. Stiff joints in old horses are examples of this. The spurious is where there is a deposit in the structures external to the joint and uniting them to each other. We see examples after acute inflammation of the joint, rupture of the suspensory ligament, which can be removed after exercising. It may be seen after open joint, and will absorb when brought into use, or it may require repeated applications of iodine to the skin.

Fig. 37—Anchylosis of Fetlock Joint.

XII.

LAMENESS.

How Diagnosed.—First determine the limb in which the patient is lame. Have the horse trotted from and towards you. The assistant who trots the horse should take hold of the reins about two feet from the head and run by the side of the horse. Of course, there are many lamenesses that can be diagnosed without even moving the horse; at the same time, there are many other cases so slight in degree as to require the most rigid scrutiny.

If the lameness be in one of the fore limbs, the patient will drop on the sound limb. If there is well-marked lameness, the head will drop in a marked degree. Do not make your diagnosis from simply having the horse trotted from you. In such case you are liable to mistake a lameness of the off fore limb for that of the near hind. When he is trotted from the observer, the quarter seems to ascend and descend. This ascending and descending of the quarter depends upon the elevation and dropping of the head and body. It will be plainly seen when the horse returns that the lameness is in the fore limb. The lameness may be in both fore limbs, and the animal seem to go sound. Advantage of this has been taken by low horse dealers, who, when they have a horse lame in one fore foot, make him lame in the other also. They do this by placing a small piece of iron tightly under the shoe of the sound foot, and by paring the toe of the sound foot almost to the quick. A horse lame in both fore feet will be short in action; each foot will be quickly lifted up and carefully put to the ground, while at the same time there is a peculiar rolling motion of the body. He may go lame in one foot as he goes from you, and in the other as he approaches the

observer. There is a peculiar action of young colts that must not be mistaken for lameness. This is called "bridle lameness." The colt may appear lame in the near fore foot, if led with a short rein and his head pulled to one side, or when he is first bitted. If run in a slack rein it will disappear. If the lameness be in the hind limb, the quarter of the same side will be elevated, and that of the sound side thrown forward and downward with a jerking motion. The head is tolerably steady if the pain be light, but there will be a decided jerk of the head if the pain be severe. There are some forms of lameness which are apparent in the stable only, the movement of half a dozen steps being sufficient to dispell the appearance of lameness. It is therefore necessary to see the horse in the stable and out of it. A horse lame from an inflammation of the bone, as in spavin, ringbone, will warm out of it. In the early stages of such diseases, a walk of a hundred yards is sufficient to remove the lameness. Many low dealers will knock a horse around in the stall to remove such lameness. There are some lamenesses which are only manifested after sharp work, and in such cases it is necessary to give the horse half an hour's trot or gallop, tying him afterwards in a stall until he becomes cool. It is only when suspicion exists that this test need be applied. Lamenesses are manifested during repose, as in many foot lamenesses. For example, a horse will continually point, or even elevate, the foot which is suffering pain; if in both feet, each foot alternately will be pointed or elevated. If made to move, the extent of pain does not seem equal to that expressed while standing still. Some horses exhibit their lameness when they turn round. They may go sound when led straight to and from the observer, but when sharply turned by the use of the whip they at once manifest their unsoundness. Turn the animal both ways, as disease may not be shown when the animal is turned one way only. There are cases where lameness exists in two or more limbs, but not equally; when such is the case, it requires great care to distin-

guish its true nature. Lameness may be discovered by manipulation, or by visible swelling of the parts. There will be observed heat and swelling. The observer, having satisfied himself as to which leg is lame, must now endeavor to find out its cause and location in the particular limb. The symptoms of lameness in the different parts, with their illustration, causes, and treatment, will be given in the following pages.

XIII.

A SPRAIN OR STRAIN.

A sprain or strain is violence inflicted upon any soft structure, with extension and often rupture of its fibers. Strains confined to the sheaths of tendons only are not as serious as when the ligaments and tendons themselves are involved. Muscular strains are found in various parts of the body, and are produced by various causes. When a muscle is sprained, the injury is followed by pain, swelling, heat, and loss of function. The swelling of the inflamed muscle is often succeeded by loss of substance, assuming a form like whitish threads of fat.

Treatment.—Repose and soothing applications, succeeded by slight and afterwards stronger irritants. Purgatives and cooling diet at first, followed by good nursing.

SHOULDER SLIP.

Shoulder slip is the name used by professional men for what is more commonly termed sweeny. There is a peculiar outward slipping movement of the shoulder joint. It would almost appear as if the shoulder were out of joint; hence the term "shoulder slip." This peculiar action of the shoulder is caused by the external muscles losing their contractile power. An injury to the muscles sets up an inflammatory action, which results in atrophy of the muscles.

Cause.—It may be caused in various ways, by direct or indirect injury. It is most commonly seen in young horses, whose undeveloped muscles are more susceptible to injury than those of a mature horse. It may be caused by putting the horse to work too soon. The plough is a very frequent cause. Jars, jerks, jolts, bruises, concussion, or any injury to the shoulder will produce the disease.

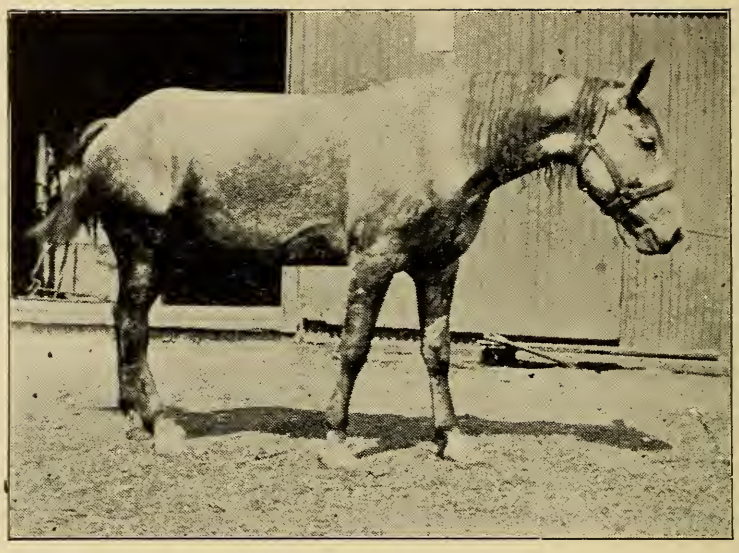


Fig. 38—The Walk in Shoulder Lameness Showing the uplifting of shoulder and whole limb, during extension.

Fig. 39—Shoulder Lameness.

Symptoms.—In some cases there will be heat and swelling over the course of the muscles on the outer surface of the scapula or shoulder blade, and in the joint itself; but in the majority of cases, lameness does not appear until there is considerable wasting of the muscles. There will be the unnatural bulging of the shoulder, as mentioned before, and a hollow space upon either side of the scapular spine, extending its whole length. The muscles involved are the antea spinatus, postea spinatus, and teres exturnus, and sometimes the flexor brachii.

Treatment.—Rest, hot and cold applications, followed with a liniment composed of equal parts of aqua ammonia, turpentine, and linseed oil every four hours. It may be necessary to use a strong blister of cantharides of usual strength. Setons are highly recommended, but my experience has been that where the atrophy is not too great, the above treatment is the best course to pursue. It will take six weeks or two or three months for the muscles to develop. When the muscles begin to appear, give light exercise, as in a buggy. Low horsemen make a little opening and blow air into the areolar tissue, which gives the shoulder a normal appearance. Shoulder slip constitutes an unsoundness.

DISEASE OF THE SHOULDER JOINT

May arise from various causes, but it is not a frequent seat of lameness. If the disease is not checked, the capsular ligament becomes changed, distended with synovia; the removal of the articular cartilage ultimately ends in anchylosis of the joint.

Symptoms.—The animal carries the limb with a rotary motion, the limb being thrown outwards and the toe made to form the segment of a circle. In some cases the toe of the foot is dragged or trailed on the ground. (See Fig. 39.) There will be pain in raising the foot from the ground. When standing the foot of the afflicted limb is held a little behind the sound one. On extending the limb the animal will rear. The parts should be extended and the animal trotted out immediately, when usually the lameness is increased. The lameness will decrease by exer-

cise. There will be inflammation and perhaps swelling of the parts. The animal stumbles and strikes his toe against little objects, and if urged to step over an elevation of any size he will refuse to do so.

SPRAIN OF THE FLEXOR BRACHII

Gives rise to a lameness which is frequently mistaken for shoulder-joint lameness. The muscle will be found swollen and inflamed, standing out prominently from the surrounding parts. This swelling, along with that of the bursa in front of the shoulder, pain upon pressure, and the gait peculiar to shoulder lameness are the diagnostic symptoms.

Treatment is the same as for that of shoulder lameness. A high-heeled shoe should be used, oft-repeated and long-continued fomentations, and the application three times a day of a liniment composed of spirits of camphor a half pint, iodine tincture two ounces. In severe cases, mercury red iodide, one part of mercury to five of lard.

SEROUS ABSCESSES—FIBROUS TUMORS.

These enlargements are frequently met with in the shoulder and scapular region. They usually occur as a result of direct injury. Inflammation is set up, an exudation takes place, forming a serous abscess. They may be deep-seated or just under the skin. In some cases they are of a fibrous nature.

Symptoms.—The ailment is usually not very sore; there will be fluctuation on manipulation. There is but little heat. If a fibrous tumor, it will be hard, and the skin will be rubbed off from the use of the collar over the seat of the tumor.

Treatment.—Use fomentations and poultices to allay irritation, and then open the abscess freely and allow the serum to escape. The abscess should be kept open for a few days, and carbolic acid, one part to forty parts of water, used to dress the wound twice a day. Pressure to the parts is beneficial, and setons are recommended by some. An abscess may have walls

several inches thick. Fibrous tumors are to be removed by the knife. The wound should be dressed three times a day with a solution of carbolic acid, one part of acid to forty parts of water. One ounce of acetate of lead, six drachms of zinc sulphate to one quart of water may be used as a dressing.

Abscesses sometimes form between the scapula and thoracic wall. They may be detected by swelling, lameness, and heat in front and below the point of the shoulder. The limb will be pushed outward by the swelling. The pus is deep-seated and requires the opening of the abscess before the usual signs of pointing are noticed. A directory should be used to find the seat of pus, and when found it should be well opened.

ELBOW LAMENESS

Is caused by injuries, sprains of the lateral ligaments, and from rheumatism.

Symptoms.—The limb is semi-flexed while standing still, and there will be excessive dropping of the head and anterior part of the body during action. If the ligaments or muscles are strained there will be pain, heat, and swelling. When the internal lateral ligament is injured the horse stands with the foot and limb thrown outwards. If the triceps muscle is the seat of injury, the forearm is flexed upon the humerus.

Treatment.—Fomentations to allay the irritation, after which apply blisters. Setons are highly recommended by some. Give rest and apply a high-heeled shoe.

CAPPED ELBOW.

We mean by this an enlargement of the olecranon, due to injury of some kind.

Cause.—The most common cause of this condition is the contact of the elbow with the shoe when the animal is lying down. The unshod hoof will produce it, and it may be caused by the belly-band rubbing the elbow. It interferes to a considerable

extent with the appearance of an animal, but it is not a serious condition by any means.

Treatment.—If of recent date, and the bursa but little enlarged, have the shoe removed, and make a free application of hot or cold water, according to the season of the year—warm if in winter, and cold if in the summer time. If considerable amount of effusion has taken place the parts must be

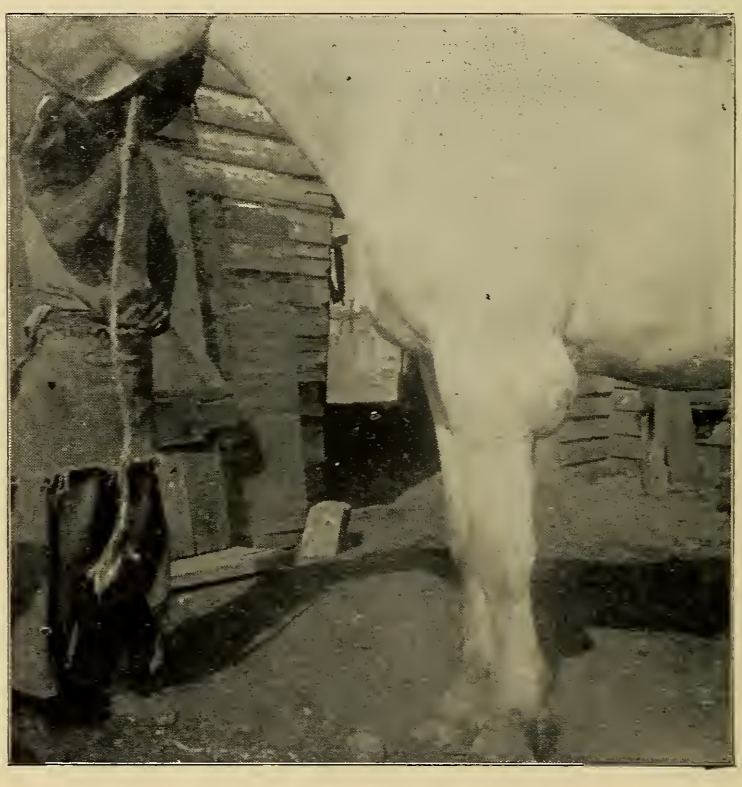


Fig. 40—Capped Elbow.

opened freely. Make the opening larger than the size of a knife blade. Generally there will be shreds lining the cavity, which may be removed by inserting the finger in the opening and breaking their attachments. If the enlargement is of long standing and of a fibrous nature, it should be carefully dissected out. In such cases the wound heals by granulation, and requires considerable time to heal. This is due to the fact that the part is one of extensive motion, and the injury may be con-

tinually aggravated by the horse lying down. Frequently such cases are six weeks healing. Small wounds in connection with the elbow frequently give rise to peculiar symptoms. A very small wound, perhaps so small that it would escape observation, may be inflicted on the point of the olecranon, or on its side, or even in the space between the thoracic wall and elbow; and, as a result of motion, air is pumped into the subcutaneous areolar tissue. I have seen the head and neck swollen to an enormous extent. Where the animal was kept moving for some time, I have seen the entire body swell and the eyes closed by the swelling of the lids. On passing the hand over the swelling it gives out a crackling sound, and if the parts be tapped there will be a peculiar drum like, dead sound.

Such a condition need occasion no alarm; all required is to find the wound, clean it well with warm water, plug it up with tow dipped in collodion, and keep the animal still. In a short time the air will be absorbed and the swelling disappear. If the nostrils should be so swollen as to endanger life through impaired respiration, it will be necessary to puncture the skin surrounding them; but such procedure is generally not necessary.

INJURIES BELOW THE ELBOW.

Injuries in this region are by no means uncommon. Sprain of the radial ligament sometimes occurs, and is manifested by lameness, difficulty in flexing the knee, swelling, heat, and tenderness immediately above the knee, posterior to radius. There will be distension of the bursa of the tendon, which appears as a fluctuating swelling at the back and slightly above the knee. In some cases the perforatus and perforans muscles are involved. In such the pain and swelling is extensive. Flexion is difficult, owing to the swollen tendons being too thick to play through their thecæ, just as a rope too thick for a pulley will not play easily. The tendons of the various muscles concerned in the flexion and extension of the limb pass through thecæ upon

the surface of the carpus, and are liable to injury with distension of their various synovial sheaths. These enlargements, when arising from injury and consequent thickening of the tendons themselves, or inflammation of the synovial membrane, cause pain. Mere bursal enlargements give cause to no inconvenience.

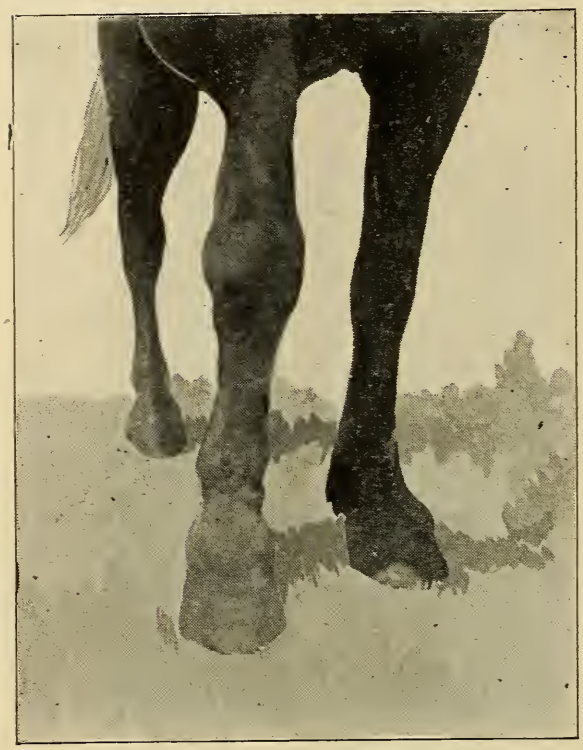


Fig. 41—Sprain of the Radial Ligament.

BURSAL ENLARGEMENTS

In connection with the knee are generally caused by an injury, such as blows, wearing a yoke, etc.

Symptoms.—There is first more or less swelling, which, after a certain length of time, disappears, leaving a little puffy tumor. This cannot be considered much of a detriment, but looks badly.

Treatment.—Remove the exciting cause and give the animal a rest. Cold water should be applied freely, in conjunction with three or four hours' pressure each day. A lotion composed of lead acetate, ounce one; zinc sulphate, drachms six; water, one quart, has proven to be of great benefit, and should be used while applying pressure. Pressure can be applied by means of a bandage properly adjusted. Finally, stimulating applications should be used, the best in this case being gum camphor, ounce one; alcohol, a half pint; iodine tincture, one ounce, applied twice a day to the parts. Some few cases may even require the use of

hydrarg. biniodi., one part to five of lard. Tr. of iodine may be used with good results.

Opening the bursa is advisable in some few cases, but should be done as a last resort. Where it is thought advisable to open a bursa, it should be done by a veterinary surgeon. There is no danger, however, in opening the bursa in connection with the extensor metacarpi magnus, constituting what is termed "capped knee." This bursa may be punctured without any hesitation, and the fluid allowed to escape. The puncture should be made at the lowest margin of the swelling, and upon its inner side. Press out the fluid and keep the walls of the sac in apposition by applying an antiseptic bandage. The bandage should be rolled around the knee from above downwards, and allowed to remain without change for five or six days, if no inconvenience is caused to the patient. If signs of pains are manifested, the bandage should be removed and adjusted.

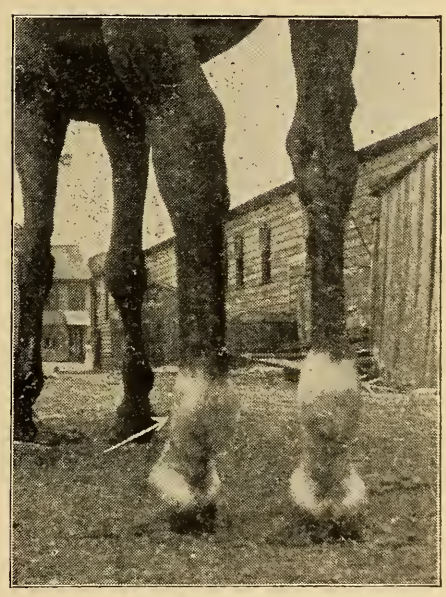


Fig. 42—Bursal Enlargements of Fetlocks. Commonly known as wind gall.

Milch cows kept in-doors are liable to have enormously enlarged knees from distention of this bursa, caused by bruising while lying upon floors. These may be opened with safety. The best method is to insert a seton right through the swelling and allow it to remain in for three or four weeks, the knee to be protected from further injury by a good, thick bed, or by a thick flannel bandage wrapped round it.

CARPITIS, OR INFLAMMATION OF THE KNEE.

This joint, one of the most beautiful structures in the body, is seldom diseased, unless from the infliction of direct or indirect

injury. The disease is most frequently seen in young animals, race horses, and hunters. Concussion from galloping on hard ground may produce it. The inflammation may involve the whole articulation, or only a part. When the whole joint becomes affected, it is liable to produce partial or complete anchylosis of the knee-joint, and interfere with usefulness of the animal. The osseous deposits are generally situated on the inner side of the joint, seldom extending to the bones of the upper row.

Symptoms.—Difficulty in extending and a peculiar curved or rotary motion of the limb; the animal does not flex the knee, stands pretty firmly, and steps slightly further with the lame than with the sound limb. Heat and swelling are generally absent, and therefore the diagnosis is difficult. One of the best guides, perhaps, in diagnosing this disease is the expression of pain when the affected joint is forcibly flexed or extended.

Treatment.—Rest, fomentations, hot or cold, according to the season of the year, should be applied. After the irritation is allayed, a liniment composed of camphor gum, ounce one; alcohol, a half pint; iodine, one ounce; chloroform, one ounce, should be used three times a day in large quantities and well rubbed in. The hydrarg. biniod. mixture is highly recommended in carpitis, and is worthy of a trial. Cantharides, one part to six or seven of lard, may be of use, if other remedies fail.

SPEEDY CUT

Is an injury inflicted in the region of the knee by a high-stepping horse. It is usually seen in animals that are out-toed to a certain extent. A high-stepper may inflict a speedy cut on any part of the limb from the pastern to the elbow; but it usually occurs in connection with the knee. When a horse strikes himself, as in speedy cut, he is liable to fall from the violence of the pain, injuring his knees, and losing the race. The wound is often inflicted while the animal is galloping.

Symptoms.—There will be an inflammation and swelling of the skin, collection of fluid in the subcutaneous areolar tissue,

constituting a serous abscess, or the formation of pus in the part, with lameness and fever. In many cases the effused fluids become solidified, in which case a permanent enlargement remains. This not only detracts from the appearance of the animal, but from its size exposes him to subsequent injuries which would otherwise be escaped.

Fig. 43—Speedy Cut.

TREATMENT.—Apply a three-quarter or Charlier shoe. The foot must be kept narrow on the inner side, and the shoes removed every three weeks; otherwise, by growth of the foot, the animal is apt to strike. If it cannot be prevented by shoeing, a boot must be worn. If not solidified, hot and cold applications should be used. Eight drachms of aloes should be given internally to open the bowels. If serum or pus be present, open it up. The thickened condition should be removed by blisters.

BROKEN KNEES.

A wound upon the anterior part of the knee, though a mere scratch, lowers the value of an animal to a great extent. Many knees are broken through carelessness on the part of the driver or rider, and are not caused by faulty conformation. A horse, well made, with very fine action, may have broken knees, and the cause be purely accidental. Bad shoeing, carelessness on the part of the rider, or vertigo may cause the trouble. Some horses fall from faulty conformation, and are dangerous to ride.

TREATMENT.—Complete rest; tie up the animal's head so that

it cannot lie down. Sponge the knee with cold water, and apply the solution of zinc and lead already referred to repeatedly for three or four days. If much swelling should arise, a purgative should be given. When the skin is cut, the edges should be brought together as well as possible, and so kept by plaster, or styptic colloid, or shellac paste dipped in lint or tow. A wound on the knee must never be stitched, for flexion of the knee will most assuredly tear out the sutures and enlarge the wound. In addition to the colloid plaster, a thin calico bandage should be applied and allowed to remain for four or five days if the case progresses favorably. If pain and swelling arise, the bandage must be removed and the wound examined; if found to be suppurating, it should be gently washed, and zinc sulphate, drachms six; lead acetate, ounce one; water, one quart, applied four or five times a day. Dilute carbolic acid—one part of acid to forty parts of water may be used. When the skin is divided, simply exposing the magnus tendon, with a discharge of synovia from the tendon, the case will result favorably. If the tendon be crushed, it may slough; severe symptoms will be presented and the animal's life endangered. The fever becomes high, respiration and pulse quickened, bowels constipated, the urinary and other secretions arrested, the wound assumes a leadened hue, the discharge becomes offensive, and the lameness excessive. When the slough is removed the carpal articulations are exposed to view. The power of extension is now lost by the separation of the tendon, and the limb is persistently fixed.

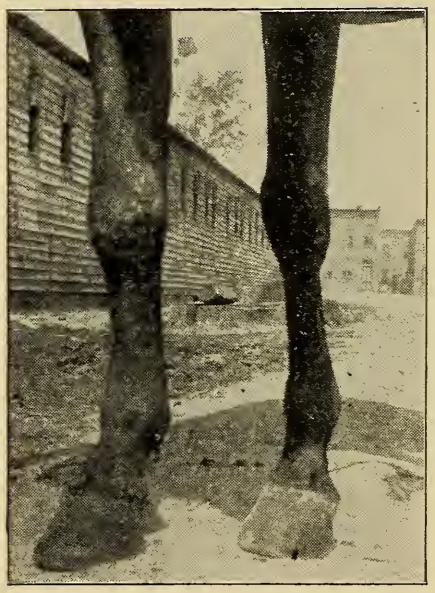


Fig. 44—Broken Knee.

Unless the patient be a valuable stud animal, it is best to

destroy it, for if even a cure is effected the articulation will be anchylosed. If an attempt to cure is made, the limb must be fixed in a straight position by means of a tin splint used in fracture, placed behind the knee and fastened by proper straps and bandages, leaving the wound uncovered. When the accident has been so severe as to fracture one or more bones of the knee, the animal should unhesitatingly be destroyed.

INJURIES BELOW THE KNEE.

The causes of lameness now to be described, extending to the foot, are mostly common to both anterior and posterior extremities. When not common to both, reference will be made.

SPRAIN OF THE METACARPAL LIGAMENT.

This ligament is often sprained, caused by violent exertion of any kind, pulling heavy loads, wearing high-toed shoes, etc.

Symptoms.—Heat and swelling of the part; in the early stages, the ligament can be felt swollen prominently, the tendons themselves being normal. The horse evinces pain on pressure of the ligament. He stands with his leg upright, moves stiffly, and digs his toes in the ground. When the tendons are affected the swelling is found further back, situated about the middle of the tendon. This swelling prevents their gliding through the thecæ, particularly the thecæ situated in the carpal or tarsal fossæ.

Treatment.—Apply a high-heeled shoe in order to rest the tendons. If treated immediately after the injury, cold water should be freely used. Ice water and bandage should be applied, and the lotion of zinc and lead previously referred to employed to reduce the fever. If the exudate has already taken place and there is great pain, warm fomentations as hot as the animal can bear should be used. When the irritation subsides, a liniment made of equal parts of aqua ammonia, turpentine, and linseed oil should be used. Firing may be resorted to in some

cases, but should not be used too quickly. Its use is very beneficial, however, in chronic inflammation of the tendon.

In chronic cases, where shortening has permanently taken place, the operation of tenotomy must be performed. Many horses with contraction of the tendons will do slow work tolerably well if a piece of iron is attached to the toe of the shoe, projecting an inch or two in front of it and slightly turned up at its anterior part. Tenotomy or division of the tendon should only

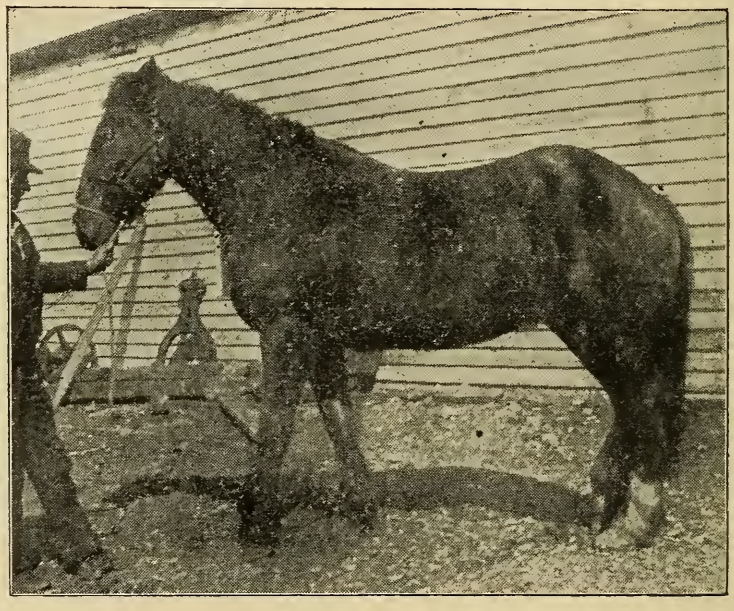


Fig. 45—Sprain of the Metacarpal Ligament.

be performed by a skilled surgeon, and the animal should be a valuable one, as it takes six months, in case of a fore leg, before an animal can be put to work again, and a much longer time if in the hind limb. The operation in the hind limb is often disappointing, even with the assistance of the lever on the toe of the shoe.

SPRAIN OF THE SUSPENSORY LIGAMENT.

The suspensory ligament is a broad band of white fibrous tissue, arising from the supra-posterior part of the canon bone, lying in the hollow between the two splint bones and termi-

nating on either side of the os coronæ and on the side of the pyramid of the os pedis. It is usually seen in race horses and hunters.

Treatment.—Rest, fomentations, bandages, and finally blisters. The animal should have a long rest. If put to work too soon, rupture of the ligament is apt to occur.

RUPTURE OF THE SUSPENSORY LIGAMENT.

Rupture of the suspensory ligament, or breakdown, as it is commonly called. This injury is a very serious one, but with a long rest and proper treatment a horse so injured may become sufficiently sound to perform moderate work. Yet there is always a weakness left which constitutes unsoundness. They can never be made fit for fast work again. Breakdown is common on the hard tracks of this continent. It rarely occurs on the soft and yielding turf of England.

Fig. 46—Partial Breakdown.

Symptoms.—If one of the branches only is ruptured, there will be slight swelling and lameness. The animal will stand or walk on the toe. This lameness may be removed by cold water and liniments, but when the animal is afterwards put to a severe test he may break completely down. The fetlock then descends, the toe turns up, and there will be heat, pain and swelling.

Treatment.—A long rest, cold and hot applications, according to the season of the year, and finally blisters should be used. Firm pledgets of tow, placed in the hollow of the heel to support the fetlock, should be used. The tow should be made into

a firm roll, the fetlock pad elevated by an assistant, the roll of tow placed under it so as to completely fill up the hollow of the heel, and fixed in that position by a bandage. Other bandages should be placed around the leg as high as possible. Cold applications should be used to relieve the inflammatory symptoms, and finally liniments should be used.

CUT TENDON.

A tendon may be cut or lacerated in various ways. Give rest and apply a shoe arranged so as to keep the limb in one position. Bandage and adopt the line of treatment that has been laid down before for injury of the tendons.

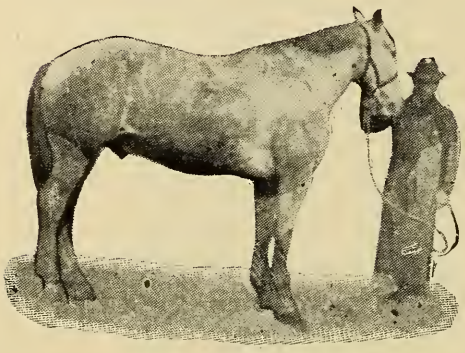


Fig. 47—Firing the Tendons.

SPRAIN OF THE FETLOCK.

There may be inflammation of the joint or sprain of one of the lateral ligaments, caused in various ways. In inflammation of the fetlock joint, from whatever cause, the lameness is characterized by inability to flex it, by heat, swelling, pain on pressure, and more or less pointing of the foot. The diagnosis is further assisted by flexing the joint, when the animal shows pain and the lameness is increased. Treat as for other injuries in the same region.

SESAMOIDITIS—INFLAMMATION OF THE SESAMOID BURSAE.

Symptoms.—Lameness, the animal going on his toe; heat at the back of the fetlock, with swelling of the bursæ. The hard enlargement of sesamoiditis is an unsoundness, and must not be mistaken for the soft, yielding swelling constituting wind galls. In sesamoiditis the capsule is fully distended with fluid, and is tense; whereas in a common wind-gall it is soft and easily pressed

from side to side. The bursæ are often the seat of rheumatism. The pain is very obstinate, for a time subsiding and then reappearing. The special treatment consists in the application of a high-heeled shoe, placing the animal in slings if the lameness be severe, and the use of cold water.

RING BONE.

This is the term applied to a ring of osseous material extending around the limb just above the hoof. Ring bones are of two kinds, true and false. A false ring bone does not involve the articulation. The true ring bone involves important articulations, and is an unsoundness in every sense of the word. Ring bone may occur in any limb, and I have seen it in all four limbs at one time. The causes of ring bone are hereditary, structural, incidental, and rheumatoid. Hereditary predisposition is sufficiently proven and acknowledged. This subject has been thoroughly dealt with in the chapter on breeding. The structural tendency is manifested in horses with upright pasterns. Hard work is probably the most common of all exciting causes. Improper shoeing, blows, and kicks may produce ring bone.

Symptoms.—There will be an enlargement, which is soft in the early stages of the disease. Considerable heat is present, and there is more or less lameness, which may be increased by flexing the joint and trotting the animal. The lameness precedes the deposition of bony matter, and is due to inflammation in the bones.

When ring bone is situated in the fore extremity, unless the deposit be on the posterior aspect, the patient puts his heel to the ground first; but when in the hind limb, in the upper part of the pastern, except it be in front, the toe touches the ground first. When located in the lower portion of the pastern the heel comes down first. When in the hind limb the animal uses great care in bringing forward the foot.

Treatment.—If located in the fore leg, and the animal puts the heel down first, a thin-heeled bar shoe must be put on the

foot. This will give great relief by allowing the animal to throw his weight upon the heels easily. If he walks on his toe, he must be shod with a high-heeled shoe. The firing iron is the best form of counter irritation in this disease. This should be done by an experienced surgeon. After firing, a vesicant should

Fig. 48—A Severe Firing of a Large and Long-Standing Ring Bone.

be applied, and nothing is better than the ungt. hydrarg. biniod., which may be washed off in three or four days, and lard or vaseline applied.

HIP-JOINT LAMENESS.

Hip-joint lameness rarely occurs, but it is possible. The trochanter major of the femur is the usual seat of lameness in that region. The trochanter stands higher than the articular head of the femur, and gives attachment to particular muscles. The summit of the trochanter is liable to injury from blows and falls. There may be sprain of the ligaments by exercise of a violent character, as slipping, falling, or turning suddenly.

Symptoms.—If there is a violent inflammation of the hip-joint, the animal will stand persistently, being very averse to

moving about in any way. The foot is elevated from the ground, and held continually in that position. There will be fever, loss of appetite and flesh, rapid wasting of the quarter, and inability to lie down. If the violent symptoms above described do not soon abate, or some signs of improvement be made manifest, the prognosis of an incurable lameness may be safely made. There will be ulceration of the ligamentum teres, ulceration of the articular cartilage, and perhaps anchylosis. In hip-joint lameness the animal has a peculiar hop and catch in his gait, with a lack of movement in the quarter. The quarter in the lame side is elevated with as little motion of the hip as possible, the other articulation being flexed with ease. When standing, the foot is lifted, wasting of the muscles take place, and a swelling in connection with the trochanter may be noticed. Heat may be felt, by pressure applied per rectum.

Treatment.—In either form a high-heeled shoe is to be put on the foot and a long rest given. Fomentations should be applied for hours at a time. The mercurial ointment previously referred to should be used, and is of value. The ailment requires a powerful medicine.

Sprain of the gluteus maximus sometimes takes place, and is very hard to distinguish from hip-joint lameness. There is the same peculiar rising and falling of the croup. The foot will be elevated, and there will be great difficulty in bringing forward the limb. Swelling will be noticed first, then atrophy.

The treatment is similar to that for hip-joint lameness. It may be necessary to use slings in this as well as in hip-joint disease.

DISLOCATION OF THE HIP JOINT.

Dislocation is never seen in the horse, unless there be fracture of the acetabulum. It may occur in the ox, dog, and cat without fracture.

Symptoms.—Shortening of the limb, pain, an abnormally prominent condition, and later swelling. The symptoms are about the same in the dog and cat.

Treatment.—Reduce the dislocation by manipulation, extension, traction, etc., brought to bear on the limb. It is easily reduced in the dog, but rarely in the ox.

STIFLE-JOINT LAMENESS.

Stifle-joint lameness is of two kinds, that within the joint proper and that in the patella articulation. The pathology of both forms is alike—inflammation, ulceration of the articular cartilage, and of the semilunæ discs, and deposit of porcellaneous deposit, when caused by rheumatism.

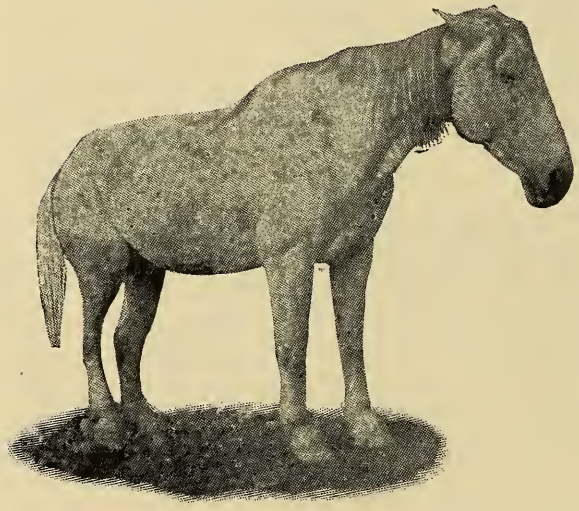


Fig. 49—Stifle Joint Lameness.

Symptoms.—The animal stands with the limb bent, the thigh flexed upon the pelvis, and the leg upon the thigh.

In lameness from disease of the bursa-patella, the horse generally walks with his toe dragging the ground, the forward movement of the limb being performed with great difficulty, the toe of the foot describing the segment of a circle at each step.

DISLOCATION OF THE PATELLA.

Complete dislocation seldom takes place. Partial dislocation, however, is of very common occurrence, the bone slipping on the outside in all cases. The formation of the parts render it almost impossible for the bone to slip on the inside.

Cause.—Falling, stepping on cobble stones, or on a rolling stone. It follows debilitating diseases, as influenza, etc. It is generally seen in young, unthrifty animals. It may occur from a scrofulous ostitis, hereditary tendency, faulty conformation, etc. Allowing weak colts to run on hilly pastures may cause it.

Symptoms.—In walking there is difficulty in bringing the limb forward. It is handled in a stiff manner, as though there was scarcely any articulation in it. On going forward and in backing the foot drags on the ground. In some cases the foot seems as though nailed to the floor. In partial dislocation, a clicking sound is heard during progression. When the animal lies down, he frequently has great difficulty in rising, and in some cases is totally unable to rise.

Treatment.—The treatment is not difficult, and as a rule is successful. Reduce the luxation by placing the animal by the

Fig. 50—Dislocation of the Patella.

side of the stall; tie a soft cord around the fetlock of the affected limb, have an assistant take hold of the free end of the cord and gently draw the limb forward; at the same time the operator should manipulate, and, by pushing the bone, force it in place. The bone will produce a clicking sound as it slips into its place. After the reduction, cold water should be applied freely, and the lotion of zinc and lead used after each application until all irritation is allayed. After all inflammation has subsided, the can-

tharides blister should be applied to the part and the horse walked after each application. In exercising an animal, if the patella on the near side is dislocated, the animal in turning should turn to the opposite side, and vice versa.

SPRAIN OF THE PATELLA LIGAMENTS.

The ligaments of the patella may be strained, and this is most common in horses used for fast work. It is very common in stage horses.

Symptoms.—There is considerable difficulty in bringing forward the limb, flexion of the joint is not properly performed, and in some cases there is a tendency to drag the toe. The animal may trot a short distance, then hop on the sound limb, keeping the affected one elevated from the ground for a little ways, and then allowing it to descend to the ground and trot off on it again. The symptoms are very much similar to stifle-joint lameness.

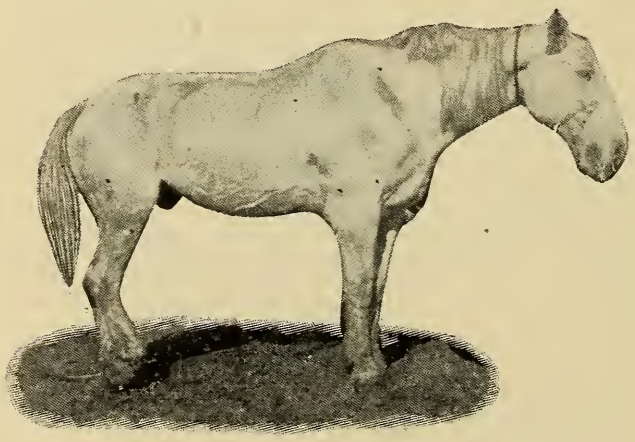


Fig. 51—Sprain of the Patella Ligaments.

The treatment is similar to stifle-joint lameness.

SPRAIN OF THE VASTI AND RECTUS FEMORIS MUSCLES.

This is caused by slipping and falling, etc.

Symptoms.—Difficulty in extending the limb. The toe is dragged along on the ground, and the animal drops considerably. There will be observed a swelling of the part, which is succeeded by atrophy. The lameness is excessive. It will take from three to six months to effect a cure.

Treatment.—Rest, fomentations, and the use of the ammoniacal liniment. In some cases it may be necessary to place the animal in slings.

SPRAIN OF THE FLEXOR METATARSI.

This muscle is attached to the femur, tibia, and metatarsal bones. Sprain is caused by jumping, falling, or being cast in any way.

Symptoms.—The symptoms are very peculiar. As a result of an injury inflicted, the muscle loses its power of contraction, while the opposing muscles at the back of the limb retain their contractile power, causing the limb to fly upwards and backwards with great violence, where it remains hanging, dangling as if broken. When the animal makes a step or removes its weight from the limb it flies back and hangs dangling as before. If the injury is in connection with the tendinous portion of the muscle, and the animal very old, it is best to destroy it.

Treatment.—Fomentations, the use of a liniment composed of equal parts of aqua ammonia, turpentine, and linseed oil, and a long rest. The animal should be fed well. It will take six months to effect a cure.

Sprain of the gastrocnemi muscles occasionally occur. The symptoms are similar to sprain of the flexor metatarsi, except that the limb inclines forward instead of backwards. The treatment is similar.

BOG SPAVIN.

Bog spavin may be defined to be a soft, puffy tumor situated on the antero-internal aspect of the hock. If the enlargement is a tense, fluctuating swelling, accompanied by heat and pain, it is an unsoundness. It indicates a change within the textures of the joint. There are bog spavins, however, which may not be looked upon as constituting unsoundness, being a mere dropsy of the articulation. Bog spavin is most frequently seen among heavy horses, and in such animals very little importance is at-

tached to it, unless actual lameness is present. But if in light horses, used for fast work, the presence of a bog spavin should be looked upon with suspicion. In such animals a bog spavin should be considered an unsoundness.

Bog spavins are caused by hard and fast work, irregular exercise, high feeding, etc. Young horses are more liable than old.

Fig. 52—Bog Spavin.

The puffy tumor can be easily seen in connection with the hock. Inflammation of the true hock joint may be acute or chronic. In the acute form the lameness is very great, with fever, loss of condition, and inability to put the foot to the ground. It is apt to terminate in ulceration of the articular cartilage and a partial anchylosis of the joint.

Treatment.—If the horse is in a plethoric condition, he should be reduced. Six drachms of aloes should be given, fol-

lowed by a half ounce of nitrate of potash, in a drench. Cold applications should be applied to the enlargement. Zinc sulphate, six drachms, to lead acetate one ounce in a quart of water may be used. Pressure should be applied by means of a bandage properly adjusted. A stimulant consisting of iodine and turpentine may be applied to the enlargement. In some few cases the actual cautery may be employed. Bog spavin is best treated in the winter.

SPRUNG HOCK.

This is an enlarged and inflamed condition of the tarsus generally, involving the structures of the whole articulation, arising from severe sprain or injury.

Fig. 53—Sprung Hock.

Treatment.—The special treatment is the use of the slings and the ammoniacal liniment. After the acute symptoms have subsided the biniodide of mercury ointment should be used to

absorb the callus enlargement. It may be necessary to use the actual cautery.

BONE SPAVIN.

A bone spavin may be defined to be an exostosis on the inner and lower part of the hock, arising from inflammation of the joint, terminating generally in anchylosis of one or more of the

Fig. 54—Bone Spavin.

gliding joints of the hock. Bone spavin is very rarely found on the outer side of the hock. It arises from causes that are hereditary or constitutional and local. The hereditary disposition to bone spavin is beyond a doubt, being well known to breeders of horses. This predisposition is not a peculiarity of conformation, as many breeds with very fine hocks often become unsound from spavin.

The local exciting causes of spavin are sprains of the liga-

ments and concussion. High-calked shoes often cause it. The hock tied in below, or sickle-shaped, is the form most susceptible to spavin. The lameness of bone spavin is, as a rule, removable in the young and middle aged, but generally incurable in horses past twelve years or their prime.

Pathology.—Bone spavin is an inflammation of the bones and inter-osseous ligaments. The inflammation originates in the

Fig. 55—A Perfect Hock.

cancellated structure of the interior of the bones; an exudation is gradually thrown out between the bones and their cartilage, perverting the nutrition of the latter, whereby it ulcerates and is removed, leaving the exposed surfaces of bone in contact with each other and their cancellated structures in apposition, thus enabling their vessels to communicate with each other. Along with the destructive process going on in the interior of the bones, an exudate is found upon their periosteal surface, extending from

one diseased bone to another, binding them together by a band of lymph—ultimately converted into bone—which locks them firmly together, preventing further motion.

Symptoms.—In examining for spavin, the animal should be made to stand firmly on all four feet. In some cases it is necessary to have an assistant hold up one fore limb, in order to cause the animal to stand squarely and firmly on both hind feet. Stand three or four feet from the shoulder and view the hock; now step to the other side, occupying the same position and compare the hocks; then step directly in front of the horse and look through between the fore legs. After this take a like view from behind. With an experienced eye, the smallest variation from the normal can be readily detected. Pressure upon the parts may elicit some manifestations of pain or uneasiness, and there is generally heat present. In the stable, the animal favors the limb, standing with it flexed. If he is made to move from side to side in the stall, he will drop on the affected limb, but on being made to walk or trot he drops on the sound limb. When first brought out after standing all night, especially if the animal has been subjected to a long drive the day before, he will go stiff and lame. If driven a mile, he warms out of it. This is characteristic of joint affection. On trotting, there is a peculiar rising and falling of the croup; the hock is not flexed

Fig. 56—An Abnormal Straight Hock.

as freely as it should be, and the horse goes on his toe to a certain extent.

TREATMENT.—A long rest, a loose box, and the firing iron. A few days after the firing, the red iodide of mercury, one part to four or five parts of lard, should be applied. This should be washed off in three or four days, and another application made, if necessary. The method of firing will be dealt with more fully at the end of this chapter.

THOROUGH-PIN.

Thorough-pin is a bursal enlargement situated on the side of the hock. It is a distension of the bursa in connection with the flexor pedis perforanus muscle. It varies in size, in some cases no larger than the end of the finger; in other cases it attains the size of the closed hand. Pressure on one side of the limb causes it to disappear on that side and appear on the other. Thorough-pin is generally associated with bog spavin. It rarely produces lameness, and should not be considered as a serious condition.

The treatment of thorough-pin is about the same as that for wind-galls, bog spavins, and other bursal enlargements.

CAPPED HOCK.

Fig. 57—Capped Hock.

Capped hock is the term applied to an enlargement on the point of the hock, and is sometimes due to distension of the small bursa situated immediately beneath the skin. In some cases it is a distension of the large bursa situated between the gastrocnemii externus and internus. Capped hock is caused by blows, kicks, etc. It may arise from a mere dropsical condition or slug-

gish circulation, and is seen after diseases of a debilitating character. Capped hock is most common among heavy horses. It is a blemish, but cannot be considered an unsoundness.

Treatment.—If of long standing, it will take some time to effect a cure. If the case is the result of an injury recently received, fomentations should be applied, and finally blisters used. The cause should be removed. If the enlargement still remains after pursuing this treatment, iodine tr. should be applied, and later iodide of mercury ointment may be applied, one part of mercury to five of lard. When serum or pus has formed it may be necessary to open up and allow the contents to escape, but opening should not be made if it can be absorbed in any way. A seton may be passed through the enlargement and the contents allowed to drain for a few days. It should be dressed with the carbolic acid lotion.

Fig. 58—Curb.

CURB.

Curb is an enlargement on the posterior aspect of the hock, due to an injury or sprain of the calcaneo-cuboid ligament. It presents itself as a small, hard nodule in the lower part of the posterior aspect of the hock. It can easily be recognized on the back of the hock, about four or five inches below the point of the os calces. Animals with sickle-shaped hocks are predisposed to curb. A long, narrow, and coarse hock is more likely to suffer from curb than one well formed. The exciting causes are hard and fast work, running, jumping, playing, and especially rear-

ing. Driving an animal in deep snow will produce it; also slipping or starting rapidly.

TREATMENT.—If treated immediately after the accident, cold applications should be applied to the part, as ice water and plumbi acetate in solution, etc. The thickened condition should be removed by the tincture of iodine. If lameness be present, fire. The animal should have rest, and a high-heeled shoe should be applied.

GENERAL TREATMENT OF LAMENESS.

After making a correct diagnosis, the first step is to remove the cause, if possible. Next, the position of the limb demands attention. If the animal stands flat on his foot, and his feet are in good condition, all his shoes should be removed. But if the feet be weak, they should be protected with light shoes. This plan, of course, is only recommended where the patient will have to lay up for some time. If the horse elevates the heel, he must have a high-heeled shoe. If he throws his weight upon the heels, a thin-heeled shoe should be used. When the parts are in as complete a state of rest as possible, the effects of the primary lesions are next to be attended to.

First reduce the inflammation by hot or cold applications. It is generally best to use cold applications first, and afterwards warm applications. In all painful affections, warm fomentations and poultices should be used. Eight drachms of aloes should be given to assist in reducing inflammation, the diet properly regulated and restricted to brand mashes, a little hay, and cool water. After the acute signs of inflammation have subsided, if the lameness still remains, counter-irritants must be used. In cases of some standing, when organic changes in the parts involved are suspected, a blister should be applied. The cantharides blister is best in tendinous or muscular wounds—one part of cantharides powd. to seven parts of lard or palm oil. For bone diseases, the mercurial ointment is the best—one part of red mercury iodide to six or seven of lard. In applying a blister,

the hair should first be clipped from the parts. The preparation should be applied with smart friction for about ten minutes. To obtain the full effect of a blister, a quantity of ointment is to be thickly laid on after the rubbing in is completed.

Blister but two legs at a time, and do not repeat the application until after six or seven days. The horse's head should be tied to the rack after a blister has been applied, that he may not put his nose to it. Tie him so that he cannot lie down. If the blistered spot be in reach of the tail, it should be tied up, otherwise it is apt to become daubed and the blister whipped on the thighs, sheath, or mammary gland. In about twelve hours, what remains on the surface should be rubbed in. In about forty-eight hours after the application, it should be washed off and a little grease or oil should be applied. The horse may now be untied, and should be loose in a box stall. Firing, or the application of the actual cautery, often removes pain very rapidly after repeated blisters have failed. In bone diseases it is of great benefit. In fact, it is almost the only treatment for ringbones and spavins. The firing may be in lines and superficial, the transverse method being the least calculated to blemish, or it may be in points and deep, by pyropuncture, and into the diseased structure. This latter method is the more easily performed, and the more effective.

XIV.

DISEASES OF THE FEET.

Perhaps no greater curse has ever been inflicted upon the horse than that of shoeing. So great is the ignorance prevailing among owners, shoers, and managers of horses, that most cases of lameness arise from mismanagement of the feet. The number of horses lame from bad shoeing is something enormous. It is not my intention here to enter minutely into the question of horseshoeing, but I hope that I may prevent, as far as possible, the unnecessary infliction of evils upon the horse by pointing out wherein they exist, and recommending a better practice than is usual in the art of shoeing. But little progress has been made in horseshoeing. It is scarcely better understood now than a century ago. The prevalent evils in the practice of shoeing arise not so much from want of knowledge as from carelessness on the part of workmen. By this indifference and ignorance, the animal's feet are injured, often ruined for life. Many times it causes disease which ruin not only the feet, but other and more vital parts. We frequently meet shoers so extremely clever that they imagine they can improve upon nature. Changing the foot has caused irreparable injury to the ligaments and tendons.

Every owner should take pains to understand thoroughly the horse's feet. He should accompany the horse to the forge; by doing so he will save expense to himself and punishment to the horse. In moving the old shoes, the smith should raise the clinchers before removing the shoe, and not violently wrench or twist the shoe off, without cutting the clinchers, as is usual. If the clinchers are not cut, the nail-holes will be torn larger, the future steady hold of the shoe weakened, sometimes tearing the crust and otherwise injuring the foot. The shoe having been

removed, the smith should rasp the wall, in order to remove any stubs remaining in the nail holes or any gravel that might have insinuated itself. Next comes the process of paring the foot, which should be done until the sole will yield to the firm pressure of the thumb. If the foot is allowed to grow, and the horn to accumulate month after month, the sole loses its elasticity, and can no longer descend; its other functions are impeded, and foundations are laid for corns, contraction, and navicular disease. The quantity of horn to be removed in order to leave the proper degree of thickness will vary with different feet. The strong foot should be pared pretty well. The concave foot should be pared until the sole will yield to pressure; the flat foot needs but little paring, while the pomaced foot should be deprived of nothing but the ragged parts. Experience and anatomical investigation point to the conclusion that the sole, as well as the crust or wall, is intended to perform the weight-bearing function. The foot should be leveled in order that the shoe may rest perfectly level on the wall and sole.

The practice of opening the heels, or, more truly, removing that which is the impediment to contraction, should not be allowed. The portion of the heels between the flexion of the bars and frog should scarcely be touched. The bar, likewise, should be left fully prominent, not only at its first flexion, but as it runs down the side of the frog. Destruction of the bars will lead to contraction. The frog should not be pared; it should project to the lower surface of the shoe; it will then descend with the sole sufficiently to come in contact with the ground, and thus fulfill its functions by relieving concussion. When ready for the shoe, one should be selected that will fit the foot as nearly as possible. A careless smith will make the foot fit the shoe, instead of the shoe fitting the foot. The toe-knife and rasp is a very convenient instrument for him, and he can soon make the foot as small as the shoe. A foot thus artificially diminished in size will soon grow over the shoe and cause lameness.

The shoe recommended by Prof. Williams is the best shoe

for the road horse. The superior surface of the shoe bearing on the sole is perfectly flat. The shoe at the heels is drawn down to one-half the size, or less, of that of the toe. This allows the shoe at the heels to rest upon the walls only. By the use of such a shoe, all the weight-bearing parts are called to action. The inferior concave surface of the shoe prevents slipping, the rim and wedge-shaped frog grasping the ground. I have used this shoe on the icy pavements of winter with excellent results. The web of the shoe should be of such thickness that when the foot is properly pared the prominent part of the frog shall lie on a level with its ground surface, so that in the descent of the sole the frog shall come sufficiently on the ground to enable it to act as a wedge, expanding the quarters, while the shoe will defend it from the wear and injury it would receive if it came to the ground with the first and full shock of the weight.

Much skill and time is necessary in leveling and fitting the shoe to the foot. The method of applying the shoe after it has been heated, somewhat below the red heat, to detect any little elevations by the deep color of the burned horn, is a great assistance in adjusting the shoe. If, however, the shoe is made to burn its weight to its seat, as is done by the careless smith, with little or no previous preparation of the foot, the heat must be injurious both to the sensitive and insensitive parts of the foot. Of the manner of attaching the shoe to the foot, the owner can scarcely be a competent judge; he can only take care that the shoe itself shall not be heavier than the work requires. Calks and toe pieces should be done away with for all kinds of horses except those used for heavy draught in town where the streets are paved and steep. All horses required to go beyond a walk are injured by shoes with turned-up heels and toes. Where possible, all horses should be shod with flat shoes. Clips on the toe and side of each shoe are useful for heavy horses, but should only be used when circumstances absolutely require them. The hind shoe should be made broader at the toe than the fore ones. The hind toe is the point on which the animal propels itself, and

therefore should be broader than the fore shoe. Another good effect is, that the hinder foot being a little shortened, there is less danger of over-reaching or forging, and especially if the shoe is wider on the foot surface than on the ground surface. The shoe is thus made to slope inward, and is a little within the toe of the crust. The hind foot is straighter in the quarter than the fore, and must therefore have a differently shaped shoe.

The length of time that shoes may be worn without injury varies with different horses. Horses with soft or pumaced feet should not wear them longer than forty to fifty days. Old horses, if their feet have never been injured, may keep them on much longer. Young horses, with their first shoes, should not wear them longer than thirty days, and should wear them only part of the year. The colt should not be shod until he is three years old. Shoes may be then put on at the beginning of winter and remain until spring, when they are to be removed and left off until the following autumn. All young horses should remain barefooted as long as possible. Feet that have been long shod, especially if they be weak, will always be tender, and should not have their shoes removed. When horses are having a rest and run at pasture, the shoes should be removed and put on again when they are brought up for work. The colt should wear a very light shoe, and should never be allowed to wear it longer than a month. In foal, no shoe ought to be worn longer than a month. The shoe should never be heavier than the work requires, and the weak foot should never wear a heavy shoe. An ounce or two in the weight of the shoe will sadly tell at the end of a hard day's work. This is acknowledged in the hunting shoe, which is narrower and lighter than that of the hackney, although the foot of the hackney is smaller than that of the hunter. It is more decidedly acknowledged in the racer, who wears a shoe only sufficiently thick to prevent it from bending when it is used.

LAMENESS FROM DISEASE OF THE PYRAMIDAL PROCESS OF THE OS PEDIS.

This exists in the fore or hind foot, and is caused by blows upon the front of the coronet, or from over-extension of the extensor tendon by the use of high calks.

Fig. 59—Disease of the Pyramidal Process of the Os Pedis.

Symptoms.—Swelling in front of the coronet, varying in size from that of a hazel nut to a pigeon's egg, with lameness. The horse puts the heel down first, and takes the foot up quickly, as soon as the toe comes in contact with the ground. There will be pain on pressure, heat, sloughing of the skin, leaving a wound that heals with difficulty.

Treatment.—Low-heeled bar shoe, fomentations, poultices, rest; succeeded by the ammoniacal liniment, and in extreme cases the cautery.

OSSIFICATION OF THE LATERAL CARTILAGES.

Side Bones.—This condition is commonly met with in heavy horses, and in the fore feet. It rarely occurs in the hind feet.

The lateral cartilages are two thin plates of fibro-cartilage, of irregular quadrangular form, surrounding the wings of the os pedis, which in virtue of their elasticity assist the sensitive frog and soft structures of the foot in regaining their natural position after being pressed upward and outwards by the weight of the animal. They may be easily felt on the sides of the foot, just above the coronet, as two yielding pads. When these be-

come ossified, they are hard and unyielding as the bone of the foot.

The process of ossification is often a slow one, unaccompanied by any acute inflammatory action, giving the animal no pain, and causing no lameness. We frequently see this in heavy horses. The causes are hereditary tendency and shoeing with high calks. Side bones are a cause of unsoundness, but if a horse with side bones has good, strong feet, open and well developed, showing no lameness, he should not be considered unsound. If the light-bred horse is found to have side bones, whether lame or not, he should be considered unsound. Side-bone lameness is characterized by bringing the toe of the foot first to the ground; when both feet are involved, by a shortness of step and want of elasticity or springiness in action, resembling that of navicular disease.

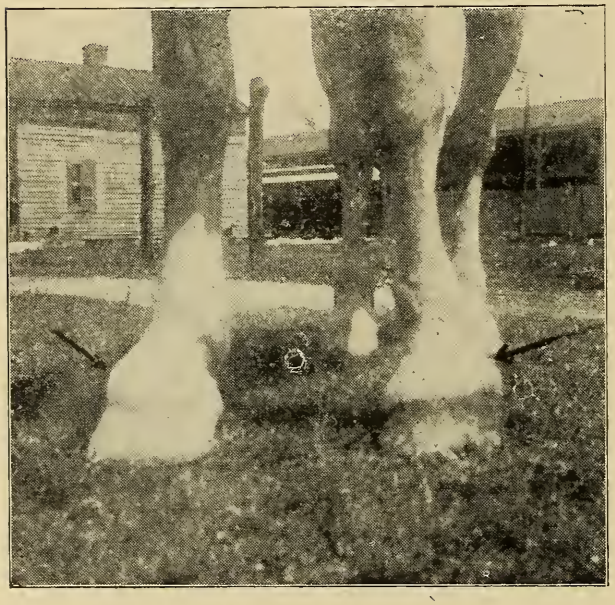


Fig. 60—Ossification of the Lateral Cartilages.

TREATMENT.—Bar shoe, rest, blisters, firing, and, should these fail, neurotomy. This operation should only be done through a skilled surgeon.

NAVICULAR DISEASE.

This is the most fertile cause of lameness known of in the better bred horses. Navicular disease may be defined to be an inflammation set up in the navicular bone, bursa, and flexor pedis perforans tendon. The disease originates in the cancel-

lated structure of the bone or the cartilage upon its surface. As a result the tendon becomes lacerated and adherent to the bone. The disease occurs in the fore feet, and is seen in saddle horses more than any other class. In all its stages it constitutes an unsoundness. The disease is always confined to the inferior surface of the navicular bone and in connection with the tendon. The great exciting cause of navicular disease is hard and fast work, particularly on hard roads. A hereditary tendency is also a cause. Certain breeds of horses are more or less subject to navicular disease on account of faulty conformation, the disease being most frequently met with in horses having short, upright pasterns and a pounding action. Allowing the animal to be idle for a few days, feeding him highly in the mean time, then taking him out for a severe ride or drive on a hard road will cause it.

I believe that, aside from concussion on hard roads, faulty shoeing is the most prolific cause of navicular disease. The practice of the smith in removing the horn from the heels and soles produces a contraction, which causes an inflammation of the joint. The great barriers to the collapse of the hoof at this part are strong heels, bars, and soles. The majority of smiths remove a quantity of horn, in what they term "opening the heels," which causes the foot to collapse and its sides approximate each other too closely.

I hold that contraction here is the cause, and not the effect of disease, as is the usual opinion. The smith frequently allows the toe of the foot to become too long, and applies a shoe, thick and irregular at the toe, which by increasing the resistance of the foot, while implanted on the ground, throws an additional strain on the tendon, which passes under the navicular bone.

Symptoms.—At first slight lameness, perhaps just after being shod. There will be pointing of the foot. The examiner must here not confound pointing from habit or fatigue with the pointing of lameness. It may come on suddenly and be severe, or it may come on gradually and be slight. A horse suffering from

this lameness comes out of the stable, after an interval of quietude, stiff and lame, but after short exercise the lameness disappears. If he be lame in both feet, his step is short and stilty, and he seems rigid and bound by some stiffness of the muscles of the chest and shoulders. These peculiar symptoms have produced the name "chest founder." There is nothing, however, wrong with the shoulders or chest. There will be heat and tenderness upon pressure at the hollow of the heel. There

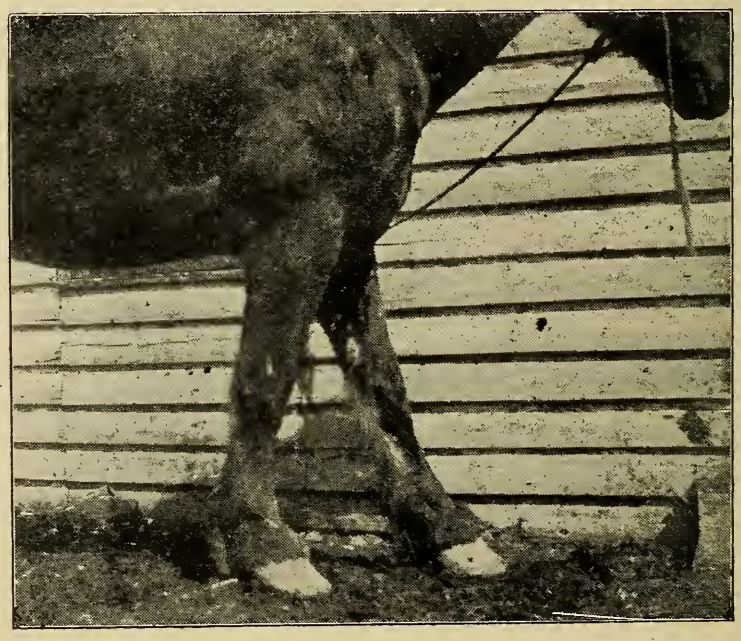


Fig. 61—Navicular Disease.

may be redness of the sole. If pressure be brought to bear on the seat of the navicular joint, pain will be evinced. This pressure must be gently applied; if not, the horse will flinch when there is no pain. The horse wears the toe of the shoe of the affected foot. If the disease is of some standing, there will be a well marked contraction and wasting of the foot and muscles of the fore limbs. The horny frog presents a shriveled appearance, in some cases dwindling in size until scarcely any frog remains. The fatty frog is also affected, causing a well marked concavity of the sole.

Treatment.—Remove the shoes; the frogs should be allowed to touch the ground; blood is to be withdrawn from the toe, or coronary plexus, and the feet placed in a cold water bath for several hours during the day, and in a poultice at night. This method of treatment, with the addition of six drachms of aloes internally, has proven successful in the early stages. At the end of a fortnight, whether the animal be lame or not, a mild blister should be applied around the coronet. If this treatment proves of no avail, a seton should be inserted through the frog. The seton should enter the frog about one inch from its toe, and brought out midway between the bulbs of the frog and the anterior boundary of the hollow of the heel. The ends of the tape must be tied together and of sufficient length to admit of a little movement in dressing. This should be saturated with a strong liquid preparation of mercury, red iodide, and cantharides, and moved a little each day. Before the seton is introduced, a high-heeled shoe should be applied to prevent the parts from coming in contact with the ground. The seton should be allowed to remain three or four weeks. If the pain be not relieved after the seton has been removed one month, treatment will be useless, and the animal should be put to work and the pain removed by neurotomy.

The operation of neurotomy requires the employment of a veterinary surgeon. It is a very simple operation to one who understands the anatomy of the parts. It consists of a division of the plantar nerves. This operation, however successful in some cases, should never be performed on a horse with thick legs or thin feet, weak in the heels, or full in the sole, or with high action, and only performed where the lameness is otherwise incurable. The bad results of the operation are fracture of the navicular bone, rupture of the tendon, sloughing of the hoof, and a gelatinous degeneration of the bursa, tendon, and surrounding tissues. These results, however, in my experience, seldom occur.

I have successfully treated what seemed incurable cases, and

where it was not advisable to perform neurotomy, by applying a shoe with two-inch calks on it, and at the same time paring the toe as short as possible.

Each time the horse is shod the toe should be pared as close as possible, and the heels not interfered with. As the foot is gradually brought in this position, the calks should be lowered, until finally they can be removed entirely. This method changes the seat of disease in connection with the bones and relieves the tendon.

LAMINITIS, OR INFLAMMATION OF THE FOOT,

Occurs in the acute, sub-acute, and chronic forms. It is also known as founder. It is one of the most dreadful diseases the horse is liable to, and is not confined to the feet, although its chief seat of pain is there. Frequently, in consequence of too long-delayed treatment, separation of the sensitive from the insensitive lamina takes place, the os pedis descends, constituting a disease known as pomaced foot. In resolution the exudate is removed by the absorptive process. When not absorbed, it is greatest at the toe, and pomaced foot is the result. In other cases the os pedis may not descend, but the functions will be interfered with, causing the hoof to grow down in a series of ridges.

Causes.—A predisposition, as weak and flat feet. The exciting cause is hard and fast work, especially on paved roads. A horse with high-pounding action is likelier to suffer with an attack of laminitis than an animal having a low, smooth action. Bad shoeing may cause it. It also follows any irritation or derangement of the digestive system, such as may be induced by the administration of food or drink in excessive quantities. A strong dose of purgative medicine may cause the disease, or diarrhœa from other causes may produce it. I have seen it follow parturition, in consequence of the irritation existing in connection with the generative system. An inflammation of any mucous membrane may extend to the feet and produce laminitis.

The whole body is usually affected. A wound inflicted during the progress of the disease will not heal readily. It occasionally occurs in one foot only, and in such case may be due to driving the animal with the shoe off. Generally the disease is confined to the two fore feet, but it is not unusual to find all four feet affected. A very frequent cause of the disease is the drinking of large quantities of water when heated by exercise. Standing the animal in a draft after being heated by exercise is a frequent cause. It is of greater occurrence during hot weather, being seldom seen in winter.

Symptoms.—In the acute form of laminitis, the symptoms are plain, and when once seen may readily be recognized afterward. The disease is ushered in by rigors, which quickly give place to pyrexia. The pulse varies from fifty to eighty beats per minute, which are full and bounding. As the fever increases, sweats bedew the body; the countenance bears an anxious expression, which shows the awful agony of the animal. The urine is voided in smaller quantities than usual, and is highly colored. If all four feet are affected, he will stand with all of his feet gathered together well up under the body, and the back is roached. If you attempt to back him, he offers all the resistance in his power. He moves backwards with every manifestation of severe pain, dragging the feet along on the ground, and often giving vent to groans. The breathing is usually affected to a considerable extent, being more or less accelerated, and greatly resembling the breathing of pneumonia. On moving, the animal exhibits a strong tendency to stumble on even ground. He makes great effort to bring the heels to the ground first, keep-

Fig. 62—Acute Lamınitis.

ing the toes from contact with the ground. When the fore feet are affected, he stands with the hind feet well under the body, supporting the most of his weight upon them, while he stretches his fore feet out in front with the heels resting upon the ground. Some few will lie down when affected, and when forced to rise will spring with the hind feet and stumble forward with a groan. Great heat will be detected in the region of the coronet, which can be easily felt through the hoof. The mouth is hot and dry, and the bowels are constipated, except where the disease is caused by super-purgation. (See illustration.) Acute laminitis runs its course in from four to six days, and generally terminates favorably.

Treatment.—In this disease nothing has proven so effectual as the use of eight drachms of aloes, where it is not caused by super-purgation. Enemas should be administered. Tincture of aconite, United States pharmacopæ tincture, twenty drops every three or four hours, is highly recommended. Potassium nitrate is almost indispensable in the treatment of this disease. It should be placed in the drinking water, or given in a drench if he will not take it in water. Three ounces should be given in the course of twenty-four hours. The shoes should be removed and warm fomentation applied from the knee down, after which poultices of bran should be applied. The poultices should be kept up for about forty hours. Then, if the animal can be placed in water, he should be allowed to stand in the stream or pond for three hours at a time during the day, and placed in a comfortable, loose stall at night. The shoes should be tacked on the third day after the attack and the animal exercised.

If relief is not obtained in four or five days after the above treatment has been employed, it will be certain that exudation more or less copious has taken place. The exudate must be removed by cutting in at the toe and allowed to escape. A very slight exudate may be removed by the absorptive process. The poultices should not be continued too long. Plenty of cold

water should be used, and the food should be of a cooling nature, such as bran mashes, etc.

Sub-acute and chronic laminitis is caused by hard work and irregular exercise. The symptoms are those of the acute form modified. The treatment, more tedious than that of the acute form, is the same, except that a blister should be applied to the coronet in the chronic form.

PUMACED FOOT

Is that condition of the foot in which the coffin bone descends. This condition occurs as a result of laminitis. It may also be caused by improper shoeing. The os pedis, in some cases, may force its way through the sole; in such case the animal should be destroyed.

Fig. 63—Pumaced Foot.

The treatment consists of removing the shoes, rest, poultices. A bar or round shoe should be applied, so that it will bear altogether on the wall and frog, and not on the sole. A horse suffering from this disease will do very well for work on a farm, but cannot do fast work.

INFLAMMATION OF THE CORONARY SUBSTANCE.

Symptoms.—Harshness and brittleness of the crust; loss of toughness and pliability; increased heat round the coronet and upper part of the crust; diminished secretion of horn, and a peculiar striated condition of the crust. The horse glides his feet along the ground. The duration of this disease is a few weeks.

It is distinguishable from laminitis by the peculiar appearance and bulging of the crust.

Treatment.—Rest, removal of shoes, poultice, application of bar shoe, cold application to the coronet, and when the heat and tenderness have subsided mild blisters. Purgatives should be occasionally administered.

CARBUNCLE OF THE CORONARY BAND.

This disease shows itself by the formation of a hard swelling on the coronet, accompanied by great pain, and febrile disturbance. After a few days, suppuration sets in, most commonly at several points, discharging a thin, unhealthy pus. There is sloughing of the sinuses or their borders. In some cases it extends up the limb to the hock or knee, causing sloughing of great patches of skin and subcutaneous tissue, exposing nerves and blood vessels. This disease is due to some change in the blood, and is constitutional. If the inflamed point be limited, and surrounded by healthy tissue, recovery may be expected, but if there be extensive destruction of tissue an unfavorable termination may be looked for.

Fig. 64—Carbuncle.

Treatment.—The wound should be stimulated thoroughly with a pencil of nitrate of silver. After using the caustic, the foot should be placed in a cold-water bath for an hour at a time during the day. When the foot is removed from the water, the parts should be dressed with a solution of the tincture of terchloride of iron; eight drachms of aloes should be given inter-

nally. The caustic is to be employed every second day until the wound becomes healthy. The stable should be well ventilated, clean, and well drained. The animal should receive nourishing food, and powd. gentian, drachms three; powd. sulphate of iron, drachms two, should be used after the febrile symptoms have disappeared.

FALSE QUARTER.

This consists of a false growth, or an abnormal secretion of the horn of the wall. It is usually due to an injury in the region of the coronet, such as treads, quittors, etc. This is not looked upon as an unsoundness. Treatment is rarely adopted if the case is an old one. If the coronet is diseased or injured, it should be treated as an ordinary wound.

SAND CRACK.

Sand crack consists of a fissure in any part of the foot, commencing at the coronet and extending to the bottom of the foot, as a rule. It is generally seen on the inner quarters of the fore foot and the toes of the hind feet. A crack in the center of the foot is termed a center crack, and when situated in the quarter a quarter crack.

Fig. 65—Quarter Crack Showing clasp.

Sand crack commences at the thin upper margin of the wall, and is usually small and insignificant at first, but it gradually extends downward and inwards until it reaches the bottom. There is more or less lameness in connection with it from the fact that when the animal is made to move the crack opens and closes, pinching the sensitive structures and causing excruciating pain.

Treatment.—Remove the shoe and apply poultices and fomentations to relieve the irritation, after which carefully trim the edges. The crack must be prevented from extending any

further by bottoming it. This is done by making a groove transversely at its superior termination. The firing iron is the most convenient instrument for doing this, and is more successful than cutting. The iron should be made to burn through the wall transversely, until the sensitive structures are almost exposed and the exudation of a little blood seen, indicating that it is almost through. The iron should then be placed in the fissure and its edges smoothed with the red-hot iron from top to bottom. The fissure should be burned enough to set up an irritation. By this method I have even seen the crack unite, though this is held by most to be impossible.

The irritation caused by firing should be allayed by poultices and fomentations. A bar shoe should be placed on the foot in order to have frog pressure. The wall is to be cut down so that the shoe cannot press upon the crack. Clenches should be applied to hold the crack together while it grows down. The instrument makers have for sale clenches of various sizes, with pincers and irons to burn the notches in the wall. They are the most convenient and effectual method of holding the cracks together. Brass plates are used and do very well. A handy blacksmith can, by cutting notches on both sides, drive and clench a horse nail. The whole secret of success lies in preventing motion of the parts. If the crack be in the toe, side clasps should be used on the shoe. The growth of horn should be stimulated by vesicants. Two drachms of powdered cantharides to three or four ounces of linseed oil makes a good dressing to the coronet.

SEEDY TOE.

This term is applied to a perverted secretion of horn at the lower margin of the os pedis, by which the crust becomes detached from the horny lamina. It is often a result of laminitis, or of the pressure of the clip of the shoe. A small or large portion may be affected. In many cases the horn can be readily broken down with the finger and thumb. It gradually spreads, and exists for a long time without lameness. If it be not arrested in its course, lameness is certain to appear sooner or later.

TREATMENT.—Remove all the diseased parts and promote the growth of horn by blisters, the cantharides blister being the best in this disease—one part of cantharides to ten of lard. The shoe clips should be removed and a bar shoe used. This condition is an unsoundness in all its stages.

CORNS.

A corn is the result of a bruise, involving the structure of the bars in the angle of the heels; occurring in the fore feet and almost invariably in the inside heel, and caused by bad shoeing. A corn consists of a bruise, and extravasation of blood, from rupture of the small blood vessels, which insinuates itself into horny texture and gives it the characteristic red appearance. It may terminate in suppuration, partial necrosis, horn tumor, or formation of bony spicula of the pedal bone. A corn constitute an unsoundness in all its stages.

Fig. 66—Corn.

TREATMENT.—Remove the shoe, and having decided that a corn is present, pare it down nicely. If the corn has festered, give exit to the pus. Poultice the foot for a few days, when the shoe recommended by Professor Williams, previously referred to, should be applied. This shoe does not reach the seat of corn. If animals were shod with such shoes, corns would be unknown. A round shoe may be used with good results. Sometimes a fungoid growth springs up when suppuration has occurred. In such a case nitrate of silver should be applied, or corrosive sublimate. Where the corn has not suppurated, it may be dressed with pure carbolic acid.

THRUSH.

A discharge of a very fetid material from the frog, arising from a diseased condition of the secretory surface of the fatty frog. The cleft is the part commonly affected. If neglected, the disease spreads over the whole organ, detaching the horn from the bulbs of the heel to the toe of the frog. Thrush is caused by standing in filthy stables or running in a filthy barn-yard; hence it occurs more frequently in the hind than in the fore feet. The heavy breeds of horses are the most frequent sufferers from thrush. It is not a very serious condition, and seldom produces lameness of any extent.

Treatment.—Remove the cause and place the animal in a dry stall. It is not necessary to lay the animal off work. Numerous methods of treatment have been laid down by the best authors, some of them very cumbersome. The treatment which I would recommend, and which has proven a direct specific in my hands, is the application of pure carbolic acid to the frog; to this apply sulphate of zinc in its undiluted form, and mix the two well into the parts. Next, dust calomel over the whole. Use plenty of the acid and zinc, and take time to work it well into the parts. Next, roll a piece of absorbing cotton in calomel and fill all the little crevices with it, pressing it firmly to the bottom and filling them up. If this is properly applied it will require but one dressing; in bad cases, two dressings. The animal should be kept at work.

CANKER.

Canker consists of a malignant growth of a fungoid nature, and usually occurs as the result of an injury, as punctures. Separation of the insensitive from the sensitive sole takes place, and a growth of an extremely vascular nature springs up, extending partly over the foot, causing a considerable amount of suffering. It is generally confined to the heavy horse, such being predisposed to the disease. The characteristic symptoms of the

disease are strongly marked, and consist of an abundant, fetid, colorless discharge from the frog, which is large, spongy, and covered with vascular prominences of a fungoid nature. The growth extends, involving the whole frog and sole, and if not checked will ultimately produce deformity of the whole hoof.

Treatment.—The treatment is tedious. The diseased surface should be removed, as well as the whole sole, by the knife. To remove the sole, cut down at the junction of the wall and sole, and follow it all around. Then cut it in halves. Throw the animal, and remove every trace of the horny covering of both sole and frog. Dress the whole of the surface with a strong solution of nitrate of silver. Pack up with tow or cotton, and place a boot on the foot. Do not remove the dressing for two days. In removing the dressing it should first be soaked with water in order to break its adhesion from the tender surface. Nitric acid may be used to destroy the growth that sometimes springs up after the removal of the horn. Usually, after the removal of the horn, the foot presents a healthy appearance, and requires but little more than cleanliness. Professor Williams recommends the use of cromic acid in the treatment of canker. Sulphuric acid may be used in its undiluted state. When a thin pellicle of horn has formed, gentle pressure, by means of tow dipped in tar, should be used. The animal should be given a dose of aloes, followed with a half ounce of nitrate of potash and an ounce of sweet spirits of nitre. This requires, under favorable circumstances, a period of two months.

QUITTOR.

A fistulous opening at the upper portion of the hoof, extending down between the sensitive and the insensitive lamina. It is generally caused by treads, pricks in shoeing, suppurating corns, or any other injury calculated to excite the suppurative action within the foot.

Symptoms.—Lameness, a hard swelling in the region of the coronet, the softening and discharge of pus. A sinus is formed,

and the wound shows no disposition to heal. Sometimes it extends, involving the whole coronary substance, presenting a number of openings.

Treatment.—It is very difficult to treat. If caused by a corn or a prick, an opening must be made in the sole, and the

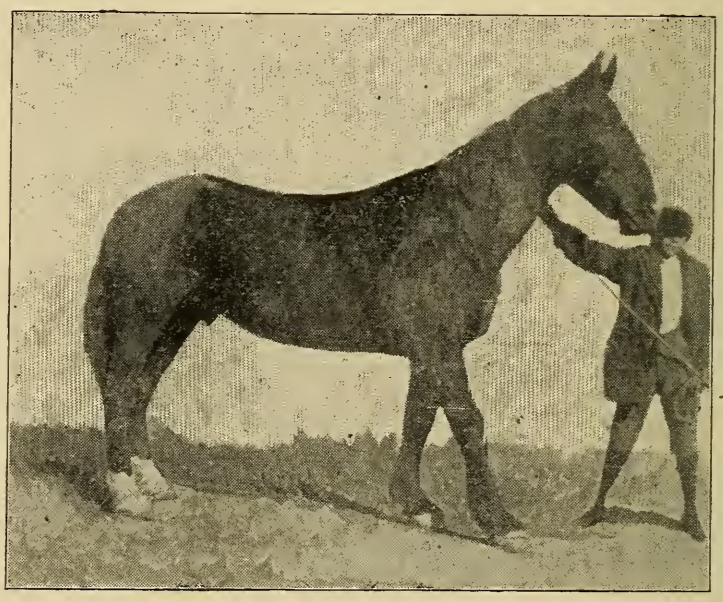


Fig. 67—Foot Lameness.

pus allowed to escape. This, along with poultices for a few days, with a blister to the coronet, will often be sufficient. Where there is no communication existing between the wound and sole of the foot, the sinus must be layed open, the knife inserted in the sinus, and cut throughout its entire length. A strong solution of bichloride of mercury, two drachms of mercury to an ounce of water, should be injected. Poultices should now be applied for a few days. Dressings of undiluted carbolic acid are beneficial.

When quittor involves the lateral cartilages, the horse must be cast, and an incision made at the junction of the horny wall and coronary substance, immediately below the seat of disease, and folded upward in the form of a flap. The diseased portions

should be carefully removed with the knife and the skin brought back to its original position and retained there by bandages. In some cases it may be necessary to strip off part of the wall. When the discharge ceases and the wound heals, the slight ten-

Fig. 68—Quittor.

Fig. 69—Bruise of Sensitive Sole. An indication of foot lameness.

derness that remains may be removed by a vesicant. The cantharides blister has proven to be the best in all foot lamenesses. Quittor is an unsoundness in all its stages.

BRUISE OF THE SENSITIVE SOLE.

Bruise of the sensitive sole may occur in many ways, and is shown by lameness. Heat is present and there is more or less extravasation of blood. On tapping or pinching, the animal evinces pain

Treatment.—Remove the shoe and thin the sole to a certain extent. Apply poultices and fomentations. Keep the foot moist for a day or two, give rest, and as a rule he quickly recovers.

CALKS AND TREADS.

Injuries of this kind are common, especially during the winter, when shoes with sharp heels and toes are used.

TREATMENT.—Remove the shoe and apply a poultice. Apply zinc sulphate, drachms six; lead acetate, ounce one; water, one pint, three times a day to the wound. If there is hemorrhage following the accident, it may be arrested by pressure around the fetlock, which should be allowed to remain for some time.

Fig. 70—Calk.

PRICKING.

Pricking a horse when shoeing him consists in driving the nail into the sensitive structures instead of through the insensitive horny wall of the hoof. Many cases of pricks are caused by drawn nails. The smith drives the nail into the sensitive part of the foot, draws it out, and drives it again. The result is great lameness in a day or two. If the nail had been withdrawn and the animal kept quiet for a day or two, there would not be any bad results. Lameness often occurs from the shoulder of the nail pressing upon the sensitive lamina, in consequence of the nail having been driven too close. In such cases the lameness does not come on for a week or so. Pricks usually manifest themselves shortly after the animal has been shod. The first step in the treatment is to pare down to the bottom of the puncture and allow the pus to escape. Apply poultices to allay the irritation. Dress the wound with equal parts of iodine, turpentine, and carbolic acid.

PUNCTURED WOUNDS OF THE FEET.

Punctured wounds of the feet by nails are very common. They are sometimes hard to find, and if puncture is suspected a careful and thorough examination should be made. If the navicular joint be penetrated, serious consequences follow. If the nail punctures the fatty frog and goes deeply into the foot in

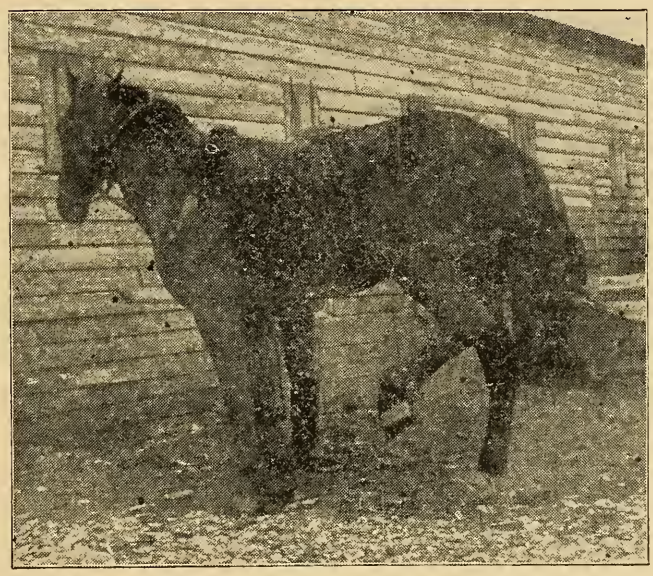


Fig. 71—Puncture of Navicular Joint.

that region it does not constitute a serious trouble. The diagnostic symptoms are nursing of the foot and a knuckling of the fetlock during progression.

Treatment.—Keep the animal perfectly quiet and open the puncture with the knife to its bottom. Saturate a piece of cotton large enough to fill the cavity with equal parts of iodine, turpentine, and carbolic acid. Dress twice a day. If the animal is kept quiet, and this method of treatment employed, suppuration will seldom take place, and the animal will be ready for work in a few days.

XV.

WOUNDS.

A wound may be defined as a solution of continuity of the soft structures. Wounds are classified as incised, punctured, lacerated, contused, gunshot, and poisoned.

The incised wound is that made with a clean-cutting instrument.

PUNCTURED WOUNDS.

Punctured wounds are such as are inflicted by means of a sharp or blunt instrument. This variety of wound is characterized by depth greater than its width. It is of a more dangerous character than incised wounds.

LACERATED WOUNDS.

Lacerated wounds are those in which the soft tissues are more or less torn. Not only the skin and areolar tissue, but in many cases the muscles are torn.

CONTUSED WOUNDS.

Contused wound is an injury inflicted by some blunt object without perforation of the skin. The deeper structures are more or less involved, causing a certain amount of effusion to take place. There will be an extravasation of blood. A clot is formed, which either causes suppuration or is removed by absorption.

GUNSHOT WOUNDS.

Gunshot wounds are rare, except in war. They are followed by inflammation, mortification, resolution, and death.

POISONED WOUNDS.

Poisoned wounds result from a bite of some venomous reptile, or may be caused by injudicious use of caustics.

TREATMENT OF WOUNDS.

Treatment.—The treatment of wounds varies to a considerable extent, being governed by their situation, nature, and variety. If it be an incised wound, it is very simple. If there is hemorrhage present, it must be arrested. If from an artery, the blood is of a bright red color, and spurts out in jets, indicating the beats of the heart. If the artery be one of good size, the end of it must be searched for, drawn out by the forceps, and ligatured. Venous bleeding is usually easily arrested by pressure, or by an astringent application, such as a solution of the chloride of iron, hot and cold application, the actual cautery, etc. When the bleeding is arrested, the wound should be carefully and gently sponged with tepid water. The water should be squeezed out of the sponge on the wound, the sponge touching the wound very lightly. The edges of the wound are kept together by means of sutures, pins, plasters, and bandages. Plasters are rarely used in veterinary practice, but their employment, especially in the lower portion of the limbs, may be preferred to that of suture. Various forms of sutures are employed for keeping the edges of the wound together. The interrupted suture is that mostly in use, its material being silk.

The suture is formed by passing the silk or wire through the edges of the wound, drawing them together and tying the ends. The twisted suture is the form employed to close the wound when bleeding. In the absence of a special pin, which can now be procured, an ordinary one may be used. Bring the edges of the wound together, and secure in place by means of the pin, which in its turn is to be retained in position by waxed hair, or silk, which is wound around the pin after the manner of figure eight. The pin should be introduced from the outside inwards,

and carried out through the opposite side at the same distance from the edge as the point of entry.

QUILLED SUTURE.

This variety consists of two pieces of whalebone, wood, or similar material, one on each side of the wound, and connected by a silk cord, wire, etc. The needle should pierce the skin not closer than an inch from the edge. This form of suture is usually employed in rupture, or lacerated peritoneum. It is useful in very large wounds where the lips have a tendency to gape. It prevents the sutures from tearing out.

THE INTERRUPTED SUTURE

Consists of one continuous thread, forming all the stitches of the wound. It is objectionable for the reason that if one stitch gives way all give way. A small opening should always be left at the most dependent part of the wound to allow the drainage of pus. The operator can judge from the animal's disposition, whether it be necessary to cast or not. As a local application to incised wounds, zinc sulphate, six drachms; lead acetate, one ounce; acid carbolicum, drachms four; water, one quart, should be used. It should be gently squeezed out of a sponge and allowed to trickle over the surrounding skin, care being taken that the sutures be not disturbed, nor the dried discharge which covers the surface of the fissure removed. Fomentations, hot or cold, and especially hot, should be withheld, because they have a tendency to bring on suppurative action.

If the wound does well, the sutures should be removed after the sixth or seventh day. If, however, the wound begins to gape, the surrounding parts to inflame, and pus be discharged, it should be gently bathed with tepid water. A thin piece of absorbing cotton saturated with diluted boracic acid should be laid on the wound, and retained there by means of loose bandages placed a little distance from the wound. Where this cannot be conveniently done, the boracic acid should be applied

more frequently, merely dampening the wound at each application. Carbolic acid, one part to forty of water, makes a good dressing.

Constitutional Treatment.—The animal should have a cooling diet, such as bran mashes; eight drachms of aloes should be given and the horse allowed to lay up.

The treatment of punctured wounds, when shallow and attended with little or no bruising, should be directed to the promotion of adhesion. As long as the oozing continues from the orifice cold-water bathing is to be practiced. When no more blood or serosity issues, a pledget of tow dipped in collodion may be applied. As in the incised wound, one ounce of acetate of lead, six drachms of zinc sulphate, three drachms carbolic acid, one quart water, should be used. The constitutional treatment is the same. In more serious cases, or in the simpler ones, when inflammatory swelling supervenes, the wound must be poulticed and dressed with the white lotion. Carbolic acid, one part to forty of water, may be used. If excessive granulation takes place, it should be touched with the nitrate of silver. If the zinc and lead lotion is used from the beginning, there will not be excessive granulations. The treatment of bruises or contused wounds is that calculated to suppress inflammation and prevent sloughing. An effort must be made to soothe and prevent undue inflammatory reaction. For this purpose, warm fomentations and poultices are to be applied. If much blood is imprisoned in the tissues, it should be removed, and where sloughing is present the process of suppuration should be assisted by poultices and fomentations. If there be excessive hemorrhage, it must be arrested by pressure, or cut down and ligatured. During the process of sloughing, the animal's strength should be supported by beer, wine, or the use of tonics. Two drachms of iron sulphate combined with three drachms of powdered gentian may be given

The treatment of lacerated wounds is directed towards the promotion of adhesion. Sutures are generally of no use; the

parts should be kept in position by means of collodion, or styptic colloid, with absolute rest. If inflammation and suppuration supervene, the treatment must be changed to one promoting the separation of a slough and the growth of healthy granulation. Irrigation with warm water and the application of the zinc and lead lotion, carbolic acid, and other antiseptics are best adapted for this purpose.

The treatment of gunshot wounds should be similar to that of contused and punctured wounds. If the lead is still in the body it should be removed by incision, forceps, or otherwise. If it cannot be removed without a very large incision, it is best to allow it to remain. It will generally be brought within reach by the contraction and by the flow of the pus, or it may be incysted and give no further trouble. If a ball lodges in the substance of a bone, it should be removed by a trephine, or death of the bone will follow. Wounds in the abdominal parietes, if shallow, should be allowed a free escape of pus, otherwise the pus will burrow between the abdominal fascia and muscles. It may be necessary in some cases to dilate the opening. The hair should be clipped from around the wound, and it should be kept perfectly clean. The deeper punctures must be treated with a view of preventing the escape of the intestines. The discharge must have free exit, and the weakened walls should be supported by a broad bandage sewed around the body. The bandage should be of a thin substance, so that the pus can easily pass through. When the peritoneal cavity is actually penetrated, or even when nearly so, the treatment should be directed to lessening the danger of peritonitis. Purgatives are to be withheld; an ounce of tincture of opium should be given and the bowels emptied by enemas. Incised wounds upon the belly are to be treated with strong sutures, the collodion paste, and broad bandage around the body. The result of wounds in this region is the production of a hernia.

In treating frost bites, cold applications should first be used. If sloughing has commenced, poultices should be used. The

wound should be irrigated and zinc sulphate, six drachms; lead acetate, one ounce; acid carbolic, four drachms; water, one quart, applied to the wound. Deodorizers are useful, such as charcoal dusted on the parts.

In treating burns and scalds the parts are to be dressed with carron oil—namely, linseed oil and lime water, equal parts. After dressing with the oil, flour should be applied over all, as it assists the oil in excluding the air. Cotton or wool may be used until the oil and flour can be got to exclude the air. Nitrate of silver, five grains to the ounce of water, has been recommended, and should be applied as often as it dries for several hours. A purgative should be given and the animal supported by stimulants, such as wine or whiskey. When pus forms the wound is to be treated like any suppurating wound. The zinc and lead lotion is a splendid dressing to the parts.

The treatment of the bite of poisonous insects consists in preventing absorption into the circulation by tying a ligature around the bitten limb upon the heart-side of the wound. The parts should be immediately excised and the actual cautery applied. Stimulants, as brandy or whiskey, should be given in large quantities. The injection of ammonia into the veins has been recommended. Arsenic has also been recommended. The following has been useful in human patients: Bromine, five drachms; bichloride of mercury, two grains, and iodide of potassium, four grains. The dose for the human being is ten drops. In the horse, sixty minims should be used at one dose.

RESULTS OF WOUNDS.

Tetanus, or lockjaw, is a result of wounds, and usually follows punctured wounds. Lockjaw usually appears about the eighth or ninth day, when the wound is beginning to heal.

Erysipelas is a result of wounds. It consists of an inflammation of the skin and subcutaneous areolar tissue, characterized by diffused swelling of the parts affected, which has a remarkable tendency to spread, and is dependent upon some alteration of

the blood. Odematous erysipelas is the most common form, and generally follows wounds of the extremities in debilitated horses.

Symptoms.—About four days after an injury, the skin in the immediate neighborhood of the wound is found swollen, smooth, hot, shiny, tender, and painful. The swollen surface pits on pressure, as a rule. The pulse becomes quick, rigors are present, and the animal is fevered.

Phlegmonous erysipelas is much more violent than the odematous, and produces a great amount of constitutional disturbance, partaking of a typhoid character. It manifests itself in twenty-four hours after the reception of the wound, by swelling, the pulse running seventy to eighty beats to the minute. This disease causes gangrene and sloughing of the tissues. The bowels are constipated, the urine scanty and highly colored. Occasionally the inflammation extends into the articulation nearest the injury, and the case becomes complicated with open joint.

Treatment.—Open the bowels with eight drachms of aloes. The swollen parts are to be frequently fomented, bandaged, and dressed with the zinc and lead lotion. The tincture of the terchloride of iron, in two-drachm doses, should be administered after the purgative has acted.

In the phlegmonous form, the treatment is similar, except that the tincture of aconite, in twenty-drop doses, should be administered to allay the fever.

Locally, zinc sulphate, drachms six; lead acetate, one ounce, in a quart of water, may be used. The parts are to be fomented with warm water and smeared with the extract of belladonna. If abscesses form, they must be opened.

MODES OF HEALING.

Wounds heal in various ways, and the mode of healing depends upon certain conditions, such as the character of the wound, the state of the patient's health, and the manner of treatment.

Immediate Union.—This can only be effected in incised wounds where the tissues are evenly divided. The lips of the wound should be immediately brought together; the blood, if any be shed, is thus pressed out, and the divided blood vessels and nerves are brought into perfect contact and union readily takes place. It is necessary that the parts be in perfect contact and in complete repose, and that means be taken to prevent the occurrence of inflammation.

Primary Adhesion.—When the mouths of the divided vessels are entirely closed, an inflammation of the parts invariably follows, and furnishes the material for union by throwing out coagulable lymph. The lymph connects the two cut edges, and finally forms between them a thin layer of connective tissue, on the surface of which a layer of cuticle is developed. Union by primary adhesion may be accomplished in a very short time, usually in two or three days.

Healing by Granulation.—It is by this method that the majority of wounds heal. At first a considerable extravasation of blood takes place. Soon the blood gradually ceases to flow from the surface of the wound; it becomes paler, and ultimately collects, like a whitish film glazing on the surface, containing an abundance of corpuscles, which become converted into pus corpuscles. The next process is the production of the material to be organized into granulations. It is seen to fill up the wound, being a substance of a velvety character. These are the granulations. If examined microscopically, there will be seen numerous cells heaped together, irregularly arranged and connected by intermediate substance, termed protoplasm. They are of varying sizes and shapes. The development of the cells gradually assumes the character of connective tissue, and the wound gradually fills up, healing from the bottom. Granulations are sometimes arrested in their development; from some unknown causes, as in indolent wounds and ulcers, the cells will not develop for weeks. Sometimes there is excessive granula-

tion, commonly known as "proud flesh," and the healing process is retarded.

Healing Under a Scab.—This is the natural method of healing wounds, and the method in which all small wounds heal, when not interfered with. The scab is formed of the fluids that ooze from their surface, dust and other foreign substance entangled in the fluid. This forms an air-tight covering, and if allowed to remain undisturbed for a few days it will drop off, when it is found that the parts underneath are healed. In cases where irritation is present, and pus forms beneath the scab, it should be removed and a new scab allowed to form. The scar that remains may be improved by gradually loosening, so that it may move easily on the adjacent parts. The tissue of the scar extends down deep into the wound, fastening itself immovably upon its surface. If manipulated, it will finally become more elastic and looser, and the morbid adhesions freed. It never assumes the exact character of the original tissue, and the scar remains throughout the animal's life; but the rudimental textures may be removed, the fibro-cellular tissue improved, and the new cuticle caused to take on the condition, to an extent, of the surrounding tissue. Lubricants, absorbents, and rubbing will relieve the scar.

XVI.

INJURIES IN THE REGION OF THE MOUTH.

The lip is sometimes lacerated. The treatment is the same as for like injury in any other part, save that in these parts there should be as little tissue removed as possible. An endeavor must be made to bring about a union of the divided parts. Sutures should be used instead of cutting and removing the divided parts, as is usually done.

A tumor sometimes forms on the lip; at first it is firm and solid to the touch, of variable size, occurring either spontaneously or as the result of a sting; in a day or two it bursts and suppurates. It requires little treatment except fomentations.

BRUISES OF THE MOUTH.

Various parts of the mouth and tongue, and the rami of the lower jaw, are sometimes bruised and injured by the teeth or by severe bites. These have been noted in diseases of bone. I would here simply state that when a horse is injured by a bit or curb, time should be allowed for the mouth and jaw to regain their natural condition before the animal is bitted, and then the bit should be of the lightest and easiest description.

EPITHELIOMA.

This is a growth of a fibrous character, and usually of malignant nature. The disease is rarely met with in the lower animals. Extirpation of the growth should be attempted by the use of caustics, or perhaps what is better, the knife. Carbolic acid is a most efficient remedy—one part of acid to thirty of water. In cases where the disease has been allowed to run its course unchecked for a considerable length of time, when the alveolar processes have become involved, and the teeth loosened, the animal should be destroyed, as treatment will end in failure.

THRUSH.

A crop of small vesicles, or even pustules, occasionally appears in the mouth, particularly during the process of dentition. In cattle, sheep and pigs thrush is common. The animal takes food with great difficulty.

TREATMENT.—Removal of the cause, and use alum as a wash. Chlorate of potash is good. Carbolic acid, one part of acid to forty of water may be tried. If ulcers form they are to be touched with the nitrate of silver.

LAMPAS.

Lampas consists of a congested state of the gums behind the bars. This is often seen between the age of three and five; seldom in old horses except from some internal ailment. We are frequently called upon to burn, or otherwise remove the trouble in old horses, whose gums are perfectly normal. All manner of persuasion sometimes fails to convince some men that the gums need no lancing, and if we decline some barbarous fellow, who has no feeling for poor animals, is ready for the task. It is seldom that colts, during the process of teething, need their gums lanced. Many a poor animal has suffered the barbarous method of burning the gums when they were normal. In a few cases where it becomes necessary to operate, the gums should be lanced with an ordinary lance, or a knife. The incisions should be very light, and anterior to the third bar. After scarifying, a solution of alum in the proportion of alum, two drachms; water, one pint, to be applied as frequently as desired. Feed on soft food for a few days. The barbarous method of burning the gums cannot be too greatly condemned.

WOUND OF THE PALATINE ARTERY.

The most common cause of wound of this artery is the jack-knife in the hands of men who are ignorant of the parts, and who practice bleeding in the mouth for every ill to which horse-flesh

is heir. Treatment is a matter of considerable difficulty. The use of the speculum will assist in getting at the parts to try the effects of a suture or two. The head should be steadied by an assistant. In some cases it may be necessary to use the hot iron to arrest the hemorrhage. Acupressure is a successful way of arresting hemorrhage.

PARALYSIS OF THE LIPS.

This is generally seen in horses that are compelled to wear heavy bridles. The lip hangs elongated, flaccid and powerless. When drinking, he pushes his nose into the water up to his eyes. This affection is due to injury to the seventh pair of nerves. The lip is often drawn to one side from the fact that one nerve only is affected.

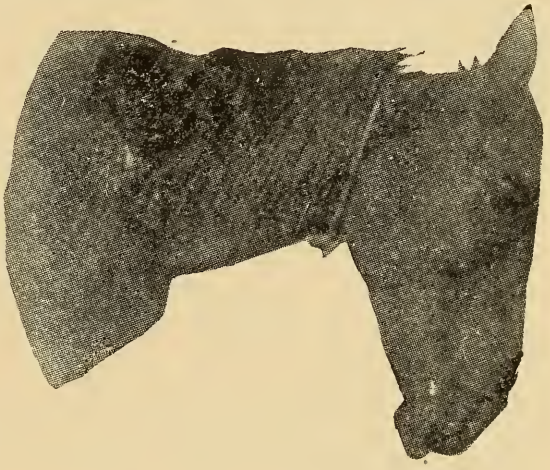


Fig. 72—Paralysis of the Lip.

Treatment.—Remove all pressure from the head and face. If the animal is tied in the stall by a head halter, this must be removed and replaced by the neck strap, or, what is better, turned loose in a box stall. The food should be soft. Fomentations and the camphorated liniment should be applied to the masseter region. If this should prove ineffectual the biniodide of mercury ointment should be tried—one part of mercury to four or five parts of lard.

AFFECTIONS OF THE DUCTS AND GLANDS OF THE MOUTH.

Open Parotid Duct.—Steno's duct winds round the inferior maxillary bone, in company with the submaxillary artery and veins, and enters the mouth between the second and third upper molar teeth. It conveys the saliva into the mouth. It is liable to be opened by direct violence, or from ulceration of its coats

when involved in the abcess of strangles. When it is opened the saliva will flow from the wound instead of flowing into the mouth. The flow of saliva is greatest during mastication.

Treatment.—The first step in the treatment of open parotid duct is to make an opening between the wound and mouth, along the course of the original canal, if possible; if not, an artificial canal must be formed, by introducing a seton from the ulcer in the mouth, which should remain for four or five days, or until it has made a suppurating channel. It is then to be withdrawn, the external wound is brought together by suture and colodion, or styptic-colloid, thickly applied. The dressing should in no way be disturbed, and the animal should be fed on milk, eggs, and such like, in order to prevent the stimulation of the glands.

This method of treatment can only be carried out by your veterinary surgeon. If you decide, however, that you have an opening of the duct, you may try, bringing the edges of the opening together with suture, paint them with several layers of collodion, and await results. In the mean time, give very little food for several days. In some cases all treatment fails. The gland should then be destroyed by injecting into its substance the following: Nitrate of silver, one drachm; nitric acid, one drachm; water, one ounce.

SALIVARY CALCULI.

Calcareous deposits may form in any actively secreting gland, or in the duct in connection with the gland. It is thought that a piece of hay or corn gains entrance to the canal, and the salts of the saliva adhering to it form concretion. The concretions block up the duct, which becomes enlarged and distended with saliva. The foreign body must be removed through the mouth. A pendulous sack will be noticed on the borders of the jaw.

Excessive secretion of saliva—ptyalism—results from disease of the teeth, some peculiar food as green food, mercuralism; any source of irritation in the mouth from the poison of epizootic aptha, or foreign body in the tongue.

Treatment.—In all cases remove the cause, and wash the mouth repeatedly with cold water, and mild astringents, such as vinegar or alum.

AFFECTIONS OF THE TONGUE.

Glossitis.—Glossitis, or inflammation of the tongue, is a condition not very often met with. The tongue is injured by being bitten, by chemicals of irritating nature, by cruel attendants, etc. There is an increased flow of saliva, and the tongue hangs out of the mouth, reddened, hot, and tender when touched. Treat with cool astringent lotions, vinegar and water. The tongue should be treated on conservative principles. Nothing must be destroyed, cut off, or removed, but all torn edges must be brought together and held by proper sutures. If, however, a portion be really gangrenous, it must, of course, be excised.

ULCERS OF THE TONGUE.

This is generally caused by diseased and irregular teeth; dirty and rusty bits, or as a result of indigestion. Touch the ulcer with a pencil of nitrate of silver, and wash the tongue with alum, borax or chlorate of potash.

PARALYSIS OF THE TONGUE.

This is due to some brain disease, or may eventually be produced by the animal's habit of lolling the tongue. It may also be caused by rough usage.

Treatment.—Replace the tongue within the mouth, and retain it there by the application of a nose band sufficiently tight to keep the mouth shut for a few hours. Bandages placed round the upper and lower jaw will prevent the tongue coming out. Nerve stimulents should be tried—drachm doses of powdered nux vomica should be given in the feed.

DEFORMITY OF THE MOUTH AND IRREGULARITIES OF THE TEETH.

Parrot Mouth.—This is a well-known deformity, in which the upper incisors project in front, overhanging the lower ones. The treatment in such cases can only be palliative, and consists in the periodic rasping of the edges of the teeth and feeding the animal on soft food. Deformities of the incisors are occasionally noticed, both as to position and number. They seldom cause any inconvenience, unless, when projecting beyond a moderate length, they bruise or otherwise injure the opposite jaw. They must be removed by the incisor cutter, and dressed by a suitable rasp, or, if not too long, may be rasped down.

The molars are often seen to be irregular. The two opposing rows are often of irregular length. The teeth not coming in wear by this means, become elongated to such an extent as to cause extensive disease in the lower or upper jaw, as the case may be. The tooth should be cut by the molar cutters and dressed to a level with the other teeth. A mouth speculum, or balling iron, should be used to hold the mouth open.

CARIES OF THE TEETH.

Dental gangrene, or decay, is confined principally to the molar teeth; the incisors seldom decay. Caries may commence primarily in the fang, neck, or crown of the tooth. Caries in the lower animals is generally caused by some injury to the teeth, as a pebble or a piece of iron being taken into the mouth. Caries in the neck of the tooth is seen in animals with teeth set wide apart, and is caused by food remaining in the interspaces, and by decomposition, exciting, inflammation in the periodental membrane.

Symptoms.—Difficulty in mastication. Frequently, while eating, the animal suddenly stops, throws up his head as though suffering a sudden twinge of pain, and perhaps drops the food from his mouth. There will be a remarkable odor, a flow of saliva, an appearance of a black spot on the carious tooth, sharp

pain indicated when the tooth is struck with the sounder, and swelling of the gums. The treatment is the removal of the tooth. The animal should be sent to the veterinary surgeon to have the teeth drawn. The surgeon only has the necessary instruments, and very frequently the animal must be cast and the trephine used to remove the tooth.

DISEASES OF THE ALVEOLAR PROCESSES.

The alveolar processes are the little depressions in the jaw in which the fangs of the teeth fit. They are diseased principally from the food being allowed to accumulate between the teeth. This food after a time decomposes and gives rise to fetid compounds, which destroy the parts in contact. The membrane covering the gums and lining the alveolar becomes inflamed, and consequently diseased.

Symptoms.—Imperfect mastication of food, loss of condition, and fetid breath, due to the decomposed food between the teeth.

Treatment.—Wash the teeth with a brush and water; the parts afterward should be washed with a solution of the chloride of lime.

DENTITION FEVER.

In the lower animal, the cutting of the deciduous teeth is never accompanied with pain or irritation. When the permanent teeth are making their appearance there is often a considerable amount of irritation. The horse from three to four years old is more subject to dental irritation than when younger. This accounts for the fact that the colt of two years old will stand more fatigue than one at three or four years of age. At this age dentition is at the height of activity. At three, eight permanent incisors are in active growth; at four years of age eight molars are cut, and four incisors in an advanced stage of growth are present. The canine teeth also make their appearance at this age. At four years of age, a cough frequently accompanies the cutting of the third and the sixth molar, or that standing last in the row. The

irritation extends from the sixth molar into the fauces and larynx, and as a result a cough is produced. The cough, as a rule, is more severe in the morning, when the animal begins to feed.

Treatment.—Examine the mouth thoroughly, and if it is found that the temporary tooth is not being shed in proper manner, it should be removed. A small pair of forceps will move these very easily. Many young cattle have been sacrificed from this cause. They have starved in the midst of plenty. It is sometimes necessary in removing the tooth to use the mouth speculum. Six drachms of aloes should be given, and the animal thrown off work, if possible, until the process of dentition is completed. A run at grass is very beneficial. If the gums are red and swollen, they should be lanced. The treatment of tooth cough is similar to that of dentition fever, with the exception that two drachm doses of the bicarbonate of soda should be given three times a day. The mouth should be gargled with a solution of the borate of soda or alum.

WOLF TEETH

Are small supernumerary teeth, which make their appearance just anterior to the first molar. They have been supposed to cause serious disease of the eye and even blindness; but they can produce no inconvenience. The irritation of teething might possibly cause a very slight irritation of the eye. If it is decided to remove them, a small pair of forceps should be used. The old way of nocking them off at the crown does no good whatever.

DISEASE OF THE PHARYNX AND OESOPHAGUS.

Post Pharyngeal Abscess.—This abscess is located in the cartilaginous division of the guttural pouch. It is seldom met with, but is occasionally associated with strangles. When it does occur there will be difficulty in the act of deglutition. It fills up the posterior nairs, draws up the vellum pendulum palati, and causes the animal to breathe through the mouth. This can scarcely be diagnosed except by a surgeon, and opening the abscess should not be undertaken except by a surgeon.

PHARYNGEAL POLYPI.

Tumors with long pedicles are sometimes seen in the pharynx.

Symptoms.—The presence of polypi in the pharynx produce symptoms of choking, difficult breathing, efforts to cough and flow of saliva from the mouth.

They are to be removed with the ecraseur in the hands of a veterinary surgeon.

CHOKING.

Choking is caused by the lodgment of food. The horse when choked makes every effort to swallow. In his effort to do so the throat and neck becomes spasmodically drawn up, and probably he gives a loud shriek when the spasms take place. The ears are thrown back upon the neck at each attempt to swallow. If an attempt is made to swallow water the fluid returns through the nostrils. There is a great anxiety of countenance, sunken head, tremors, partial sweats over the body, and great exhaustion.

In the cow the obstruction is generally a piece of turnip, potato, apple, or leather. The cow is very fond of chewing old shoes. The symptoms of choking in the cow are tympanites of the rumen, involuntary action of the jaws, flow of saliva from the mouth, and a violent cough, causing forcible expulsion of the fæces and urine. Tympanites is also seen in the horse. In the dog violent retching and cough, with staring, prominent eyes, are the most prevailing symptoms. When the obstruction is in the cervical region, it can be detected. If it is lodged high up in the cervical region or neck, symptoms of suffocation will be present.

Treatment.—Endeavor to find out the cause of choking, as the treatment depends to a considerable extent upon the nature of the obstruction. An effort should be made to dislodge the obstruction by manipulation. The head of the animal should be held by an assistant while the operator gently manipulates and endeavors to break up the mass. If it be an apple an effort should be made to force its passage to the stomach by gently manipu-

lating. If the obstruction is high up in the throat, effort must be made to remove it through the mouth. To assist in reaching the object, an assistant should push it upwards. If these methods fail, the object may be removed by drenching with oil and water. In choking with dry food, the oil must always be used, as the probang cannot be used in this case. In addition to the oil, the mass is to be broken up by rubbing the neck and by pushing it upwards and downwards by gentle manipulation. Frequent drenches of water, filling up the œsophagus, will assist in removing the mass. When these means fail to unchoke the animal, the probang should be used. This can only be done by a surgeon. All veterinary surgeons have probangs for the horse and cow. I have frequently been called to an animal and found that an effort had been made to unchoke the animal with a whip stalk. In every case where it was used, the œsophagus was ruptured, causing the animal's death. In case the probang proves of no avail, the operation of œsophagotomy must be performed. It consists of cutting down upon the object and removing it. After its removal the edges of the œsophagus should be brought together and held by sutures of carbolized cat gut. The external opening may be secured by silk sutures. The after treatment consists in keeping the animal quiet and feeding on liquid foods. Allow no solid food until the wound is entirely healed. This operation should not be performed except as a last resort.

DILATATION OF THE OESOPHAGUS.

As a result of choking, the œsophagus may become abnormally dilated, or a pouch may be formed in which food accumulates. If in the thoracic region the animal will be a slow feeder, and subject to repeated attacks of choking. If in the cervical portion of the œsophagus a bulging may be seen and felt.

Treatment.—Very little can be done. The animal should be fed on sloppy foods, and when the fit of coughing comes on oil should be given. If in the cervical region, considerable advantage results from the use of a pad placed over the part.

STRICTURE OF THE OESOPHAGUS.

This occurs as a result of choking. The walls of the œsophagus become thickened to a certain extent. It may exist with dilatation of the œsophagus.

Symptoms.—Frequent fits of coughing. On attempting to use the probang the structure can be detected by its resistance to further passage.

Treatment, as a rule, is useless, but it may be overcome in some cases by passing a probang each day.

RUPTURE OF THE OESOPHAGUS.

This may be caused by using too great force when passing the probang, the use of sticks by inexperienced men, etc.

Symptoms.—The animal is dull and listless, respiration is affected, and swelling can be detected over the course of the œsophagus. The animal evinces pain on pressing the parts. Soon the whole neck becomes swollen and the breath fetid. A history of the case will assist in diagnosis. If a stick has been used to unchoke a horse and the above symptoms follow, it is certain that rupture has taken place.

Treatment.—As a rule, treatment is of no avail; but, if it is a small rupture, it may be cut down upon and sutures tried.

CRIB BITERS AND WIND SUCKERS.

Horses which are crib biters or wind suckers are to be considered as unsound, as the vice generally causes indigestion. A crib biter seizes the manger, or any other object, with his teeth, arches his neck, and makes a belching noise. Many crib biters thrive moderately well, while others are unthrifty and hidebound.

The wind sucker smacks his lips, gathers air into his mouth, arches his neck, gathers his feet together, and fills himself with air. Of the two vices this is the worst. A wind sucker is more

subject to indigestion. I have seen crib biters thrive as well as others. The best mare I ever owned, that could stand the most driving, and kept the fattest, was a crib biter.

To prevent crib biting, use a muzzle or neck strap buckled tightly around the neck. For wind sucking a strap studded with sharp points of iron, opposite the lower jaw, is the best preventive.

XVII.

TUMORS.

May be defined to be hypertrophies or over-growth, and are of great variety. A tumor differs from an inflammatory exudate, in that it increases in itself, and grows as a part of the body by its own adherent force, depending on the surrounding parts for little more than a supply of blood, from which it appropriates its nourishment. As a rule, a tumor increases constantly, whereas an inflammatory exudation depends upon a morbid state of the parts, and increases in size only so long as the morbid action continues.

A tumor rarely actually disappears, and thus differs from an inflammatory growth. They usually develop from small beginnings. Some grow rapidly, others slowly and intermittently, and there is no limit to their growth, some reaching enormous size. They deprive the organ on which they are placed of nutriment, and are attended with more or less inconvenience or danger. We speak of a tumor as being malignant when it has a tendency to destroy and infiltrate into surrounding tissues; when it tends to recur after removal, and where there is no healing. The most common forms of tumor met with in the lower animals are fibrous tissue tumors, fibromata, and ordinary warts.

FIBROUS TUMOR.

The fibroma, or fibrous tumor, is slow in growth, and is not accompanied by pain or tenderness; is of a hard, rounded form; generally movable, and contained in a wall of areolar tissue. An example of this is a fibrous tumor between the neck and point of the shoulders, caused by the collar. When cut into, it will be found to have thickened walls containing a little pus. This old abscess may be removed by excision of the whole mass. If they

are small, their removal may be tried by caustics and stimulants, as iodine; but if they are of any size, the knife should be used.

PAPILLOMATUS TUMOR.

The wart is an example of these. A wart consists of a thickening of the epidermis, or skin, producing by accumulation of its scales, with hypertrophy of the papillæ of the true skin. They are found most commonly in young animals, their favorite seat being the under surface of the abdomen, the genitals, mammary glands, lips and eyelids. In the dog they are found in great numbers in the mouth. They may be removed by incision or tortion. The ecraseur is a good instrument for removing them. After their removal their seats should be cauterized. When in the mouth of a dog they may be snipped off with a pair of scissors. Washing the mouth twice a day with vinegar will sometimes destroy them. When located on the eyelids, great care should be exercised, or the animal may be damaged for life. One drachm of arsenious acid to one ounce of lard is the best preparation for removing these warts. They may be gently touched with an acid.

There is an epithelial tumor occurring in the vagina, especially in the bitch. They have a tendency to bleed. Several of them form a tumor. They are to be removed by enclosing in a clam and cutting off by the cautery.

FATTY TUMOR.

Fatty tumors, or lipomata, consist of normal fat cells packed together. Their removal is similar to other tumors. Tumors connected with the nerves are termed neuromatous tumors. They have been seen in our patients as a result of division of the planter nerves, for foot lameness. They are oval bodies, with their diameter along the course of the nerve. They vary in size, and are very painful. The only treatment is excision by the knife.

CARTILAGINOUS TUMORS.

These are generally seen on the sternum, or upon the ribs. To the touch these tumors are hard and dense, but present a slight elasticity. When on the sternum they interfere with the animal's movements, causing him to move with the four legs wide apart. The tumor is generally fastened to the bony wall and invested by the periosteum, which is generally thick and overgrown. When cut into they present a pinky white appearance, with gritty points of ossification.

TREATMENT.—The only method is their removal by excision.

We have seen crusta petrosa tumors in connection with the teeth, but these are seldom seen, and never give rise to any inconvenience.

Calcarious tumors consist of a deposit of calcarious salts in various parts of the body. They are found in the brain of the horse, in the testicles, and the nerves.

OSSEOUS TUMORS.

These are common in the neighborhood of joints where the articular surface is affected with caries, and sometimes surrounding the tendons of the limb. They result in the ossification of an exudate, which has been formed in consequence of some inflammation.

CYSTIC TUMORS.

These are formed by enlargement and fusion of the spaces or areola of the connective tissue. In these spaces fluid accumulates, and gradually the boundaries of the spaces are leveled down and walled in till a perfect sac or cyst is formed, the walls of which continue to secrete. Some cysts are formed by dilatation and growth of natural ducts or saculi, as are those sebaceous or epidermal cysts, which, formed by hair follicles, have permanent openings. Serous cysts arise in two ways—from effects of pressure and without evident cause. Examples of the first are

capped hock, capped elbow, and other serous abscesses. Serous abscesses are soft tumors formed by an effusion of serum. When they form on the elbow, the best treatment is puncture of the tumor, to be afterward injected with iodine solution. The wound should be kept open until the cavity is destroyed.

When cysts have become consolidated they may be removed by excision, or by puncturing the tumor in several places, and inserting equal parts of arsenic and corrosive sublimate. After the slough caused by the application has been removed, it should be kept clean for a few days, and then reapply the caustic. If excision with the knife is preferred the incision should be made in a perpendicular direction.

CAPPED ELBOW AND HOCK.

Capped elbow is caused by the animal lying upon the heels of the shoe. The treatment is removal of the cause, and if serum is present it should be opened.

Capped Hocks.—The treatment of capped hocks is different; if the enlargement is not very unsightly it is best to leave it alone. If it is decided to reduce it, a seton should be inserted through it and allowed to remain for two weeks. Repeated application of iodine will reduce it. If possible the horse should be turned out on grass. Collections of fluid forming cysts in front of the patella and knees may be opened with safety. When they occur on the knees of horned cattle, from lying on hard floors, they may be removed by the seton, and bandaged to prevent bruising while the patient is lying down. Cysts occur in the ovaries, mammary gland, thyroid bodies, and mucous membranes.

THE SARCOMATA.

The sarcomata are by far the most common forms of malignant tumors met with in veterinary practice. When cut into they are of a soft, brain-like consistence, of a reddish white or gray color, very vascular. They vary in consistence from hard-

ish nodulated masses to a soft colloid character. It will be a hard matter for the stock owner to distinguish the different tumors. The different varieties will be given here, and as the treatment for all is practically the same, there can be no mistake made in the method of getting rid of them.

The tumor that will interest the stock raiser perhaps most is the melanotic tumor, or melanotic sarcoma. It is seen almost exclusively in gray or white horses. Its favorite seat is on the under surface of the tail, around the anus or vagina, or the perinæum. All parts of the body, internal and external, may be affected by these tumors. In some cases there are no external tumors. They grow to an enormous size in some cases, and are of a malignant nature. It appears first as a small round tumor, which gradually enlarges in every direction within and upon those portions of the body which do not lose their black color by age. Other tumors form in the neighborhood forming a collection similar to a bunch of grapes, but larger in size. The animal does not suffer much inconvenience unless there is friction produced upon the surface of the tumor. A black tumor in any part of the body may be called melanosis. It is generally confined to aged animals.

The treatment of melanosis is early removal, which may check its growth for some time, but it cannot be permanently removed. I have removed but one melanotic tumor that did not reappear some time in the animal's life.

ACTINO MYCOSIS.

This is a malignant parasitic tumor caused by the parasite actinomyces. This has been referred to in a previous chapter of this work.

HARD CANCER.

A hard cancer is white in its structure, arranged in masses with projections passing from its center to various parts of the organ which it attacks. It cuts up almost like cartilage. It differs from a simple tumor by being more rapid in its growth, by

its tendency to involve the lymphatic glands, to break through the organ in which it is developed, and to involve neighboring textures. When it does not interfere with the vital functions, it seems not to affect the constitution for a long period.

The only treatment is early removal. I have removed them with good success. Professor Bennet recommends a weak solution of acetic acid, to be injected into the tumor.

SOFT CANCER.

There are two forms of soft cancer—colloid and medullary. The colloid is seen in different parts of the body. It consist of fibers so arranged as to form alveolar, or spaces varying in size, and containing amber colored liquid matter, but sometimes opaque and of a greenish yellow hue. Medullary cancers are developed in the form of circumscribed tumors or infiltrations. It may present itself as one tumor, but when cut into it will be found to be made up of several smaller ones. To the touch it presents a peculiar soft, elastic feeling, as though it contained pus. The veins over the tumor are congested. When the tumor is cut into the lobes are seen to be composed of a peculiar soft substance, which is easily broken and resembles matter. There are masses of peculiar-looking substances found in it resembling cysts. Medullary cancer may arise from an accidental injury, such as a blow or wound. It may exist for a long time before it attains any great size.

XVIII.

DISEASES OF THE EYES.

SIMPLE OPTHALMIA

Is caused by a blow, as a stroke of the whip, a foreign body in the eye, ammoniacal vapors from filthy stables, extremes of heat and cold, or sudden alterations of temperature.

Symptoms.—A closure of the eye, copious flow of tears, the eye retracted from the light, the pupil dilated, and there may be some swelling. The conjunctiva is covered by a number of red streaks. The flow of tears may after awhile be followed by a discharge of a purulent character, which ceases after awhile, and is in turn succeeded by a film between the layers of the cornia. The exudate soon disappears by absorption. Simple opthalmia is said to occur in an epizootic form.

Treatment.—Find out the cause; if a foreign body is in the eye it must be removed. The irritation should be allayed by warm fomentations in the winter and cold in the summer. The eye should be fomented with warm water for ten minutes, and a decoction of hops, placed in a little bag, applied to the eye and allowed to remain several hours at a time. This should be repeated three times a day. The animal should be placed in a darkened stable free from ammoniacal vapors. A decoction of poppy heads, when they can be procured, is very beneficial. Zinc sulphate, drachm one; opium tinct., ounce one; belladonna tincture, ounce one; water, six ounces, should be applied to the lids of the eye as well as the eye itself three times a day, by means of a little piece of sponge. If this treatment be carried out the eye will soon recover, if it can be saved.

In some cases it may be necessary to reduce the congestion of the vessels by local bleeding from the angular veins situated on

the face immediately below the eye. The results scarcely justify the operation, but some relief may be obtained by bleeding. Belladonna extract is very useful in ophthalmia, or atropine may be used instead. A solution of atropia sulphate, grains four; aqua distilled, ounce one, may be used in the eye.

The film that spreads over the anterior aspect of the eye consists of an exudate which continues as long as the irritation lasts, but afterwards gradually disappears by absorption. The deposit is within the structures of the cornea and conjunctiva, and until the inflammation has subsided all irritating applications are apt to do harm. When it becomes necessary to remove the exudate, and the inflammation has all subsided, nitrate of silver, grains five, to aqua, one ounce, should be used to touch the parts.

PERIODIC OPTHALMIA.

This disease is not so frequent as it was fifty years ago. The advancement of veterinary science has been the cause of its disappearing. It is a constitutional affection, terminating in an opacity of the crystalline lens, termed cataract.

Symptoms.—The attack generally comes on suddenly and in the night. The eye is very weak, the upper lid droops, and the eye seems smaller than its fellow; it is drawn into the orbit by the retractor muscles. The eye retracts from the light. One eye is generally affected at a time. There is a slight redness of the conjunctiva, but not to the same extent as in simple opthalmia. The cornea is dim in appearance, with a well-marked ring around it. The eye assumes a yellowish brown appearance. The iris is always affected to a degree depending on the severity of inflammation. The subsidence of the attack is marked by a diminution of the inflammatory symptoms. The haziness slowly disappears from the cornea. The pupil becomes larger, less contracted and rounder. The eye clears up, but is smaller than before the attack. The wrinkled appearance of the eyebrows after the acute symptoms have passed off is characteristic of periodical opthalmia. The eye having gained more or less of its natural

appearance may remain free from active disease for an indefinite period. Then suddenly it is attacked again without any appreciable cause. Each succeeding attack is marked by increased severity, until loss of vision results.

Treatment.—Treatment is unsatisfactory; the ailment cannot be cured. The treatment can only be pallative, and is adopted with the view of mitigating the severity of the attack. The treatment should be similar to simple opthalmia. A purgative should be administered—eight drachms of aloes. The disease terminates in cataract. A cataract is an opacity of the crystalline lens, or its capsule. It makes its appearance after subsidence of the acute inflammatory stage of periodic opthalmia. It appears as a little white speck in the center of the pupil. This grows at each successive attack until it quite fills up the aperture. The vision grows less and less distinct during its formation. Although cataract is generally a sequel to periodical opthalmia, it by no means follows that this is the only cause. It is occasionally noticed in ground animals as soon as born, and is known as congenital cataract. It may result from an injury to the eye, or without any previous irritation.

Symptoms.—It can be easily detected, if it is of a good size. The eye affected is retracted, sudden exposure to light causing the eye to contract to an unnatural degree. To see a small cataract, the horse should be placed in a darkened box, and the eye examined with the aid of artificial light, as a candle. The pupil should first be dilated with belladonna or atropine. The examiner should keep any bright object, which he may have about his person, concealed, or it may cause a reflection from the eye of the patient and mislead the observer. On moving the light from side to side there may be observed an erect image, which is reflected from the surface of the cornea. This image moves in the same direction. A second image may also be seen, which is also erect and moves in the same direction as the candle. This is reflected from the anterior surface of the crystalline lense. A third image, which is inverted and moved in the direction oppo-

site to that of the candle, is seen reflected from the posterior surface of the lense. When cataract is present the latter image, and sometimes the second one also, is rendered indistinct and wholly invisible.

A good examination of the eye can be made where the disease is well marked, but cannot be detected in the light; by bringing the horse from the darkened stable to the open door, and trying the head on a line with the rays of light without and above. A proper light can be thrown on the eye in this way. The animal may be brought to the stable door; place a black hat over the eyes for a few minutes, then move it suddenly, and observe the effect of light on the pupilary opening of the eye. The opthalmoscope is a good instrument for examining the eyes, but it requires some practice to use it successfully. Generally the above method is all required. No treatment; the disease is incurable in the horse.

AMAUROSIS.

This condition consists of a partial or complete loss of vision, as result of paralysis of the optic nerve and expansion of the retina, without much change in the appearance of the eye. Amaurosis as a disease of the optic nerve is incurable, but the condition often exists as a symptom of other diseases in the body. It occurs in parturient apoplexy in cows and in the last stages of other diseases. It may result from injury to the optic nerve, by the animal receiving blows on the head. A horse remaining for a long time in a dark place, as dark stables, coal pits, etc., may be affected with this disease. Excessive hemorrhage has caused sudden and permanent amaurosis.

Symptoms.—The pupil is greatly dilated, loses its natural form and becomes round. The eye is prominent, bright, and has a peculiar glassy appearance. The eyelids are opened more than natural, with a peculiar staring look. The gait, and movement of the ears, are indicative of blindness. It generally affects both eyes. I have never seen a case where but one eye was affected.

TREATMENT.—It is incurable. When it results as a symptom of other diseases the cause should be removed. Powdered nux vomica in drachm doses may be used, or bromide of potash in three-drachm doses may be tried in the acute stages. Both may be administered in the feed.

GLAUCOMA.

A disease in which the vitreous humor loses its transparency and assumes a blue color. It is a very uncommon disease, and is usually associated with cataract or with amaurosis. It is generally seen in old animals.

TREATMENT.—The condition is incurable.

FUNGUS HAEMATODES.

This growth is known also by the name of medullary sarcoma. It is a dark colored, highly vascular tumor of a cancerous nature. It is a malignant disease, and very rare. It is occasionally associated with tuberculosis. If removed, it will reappear in nearly every case. Unless removed at a very early stage, it admits of no cure.

SYMPTOMS.—Slight irritation is noticed and there is a flow of tears; the cornea enlarges and bursts, and a small fungoid tumor makes its appearance, passes through the opening, and grows rapidly until it hangs down over the cheek, collecting dirt, etc.

TREATMENT.—Everything within the orbit must be included in the operation, and the surface cauterized with the hot iron, not only to retain the hemorrhage, but to destroy any part of the malignant growth that may remain. If the patient be a cow, ox, or sheep, and in a fair condition, it should be slaughtered, as the disease is apt to return and cause death.

STAPHYLOMA.

This disease is so named because its tumor resembles a grape. The cornea loses its transparency, rises above the level of the eye, and even projects beyond the eyelids in the form of a whitish colored tumor.

This disease is generally seen in dogs and occasionally in horned cattle. In the dog it occurs from two causes—a growth of a tumor and bulging of the cornea caused by distention of the anterior chamber by increased secretion of its natural contents. In the first form, there will appear a small ulcer excavation in the center of the tumor; the ulcer has a tendency to eat its way through the cornea, and destroy the eye by allowing the escape of its contents. If an ulcer is present it should be touched with a point of the nitrate of silver. Afterward the thickening may be removed by excision, or by caustic.

Staphyloma, due to dropsy of the eye, admits of but one remedy, and that may prove to be only palliative. The cornea is to be punctured to allow the escape of the contained fluids. Ulcers of the eye are best treated with the nitrate of silver, either in solution or in its solid form.

LACERATION OF THE CORNEA.

This may occur in various ways, causing the escape of aqueous humor. If it is a clean cut, the chances are that the cornea will heal and the aqueous humor be reproduced. But if the cornea is badly lacerated or torn, inflammation will set in, and the aqueous humor will not be reproduced. There usually remains a slight cicatrix, which, as a rule, does not interfere with vision.

WORM IN THE EYE.

Two kinds of worms have been noticed inhabiting the eye—the filaria oculi, and the strongylus equinus. They vary from half an inch to about two inches in length. The parasites are taken into the stomach along with the food or water, and reach the eye through the circulation. After reaching the eye, the parasite develops and grows very rapidly. The movement of the worm in the eye sets up an irritation, which causes a flow of tears. On examining the eye something like a thread may be seen. The worm moves about quickly. If allowed to remain, a loss of vision will result.

TREATMENT.—The only method by which the worm can be removed from the eye is by means of a surgical operation, and consists of an incision through the cornea, allowing the aqueous humor and the worm with it to pass out. This should be entrusted only to the veterinary surgeon. In some cases it becomes necessary to place the animal in a darkened box for a few days, allow the aqueous humor to reaccumulate, and operate again where the worm could not be removed by the first operation.

STRABISMUS SQUINTING.

Irregular action of the muscles of the eye never occur in the lower animals except as a symptom of other diseases or forms of poisoning. Myopia, no doubt, exists in our patients, resulting from too great convexity of the crystalline lense and cornea. It causes shying. In the human subject the defect is remedied by using concave glasses. There is no other remedial measure known; therefore the animal goes without treatment.

HYPERMETROPIA.

This is the opposite condition, and constitutes far-sightedness. This is remedied in man by convex glasses. As our patients can use no glasses, we know of no remedy for the lower animals. Ossification of the eye-ball is noticed sometimes. Calcarious growths, melanotic deposits, and ossious deposits are sometimes seen in connection with the eye. They are incurable. Ulceration of the cornea has been referred to under the head of staphyloma, and should be treated by touching the ulcer twice daily with nitrate of silver—ten grains to an ounce of water. Pay particular attention to the animal's health.

DISLOCATION OF THE EYE-BALL.

This may occur in various ways. It occurs very frequently in dogs fighting.

TREATMENT.—If seen at once, there is a possibility of returning the eye and keeping it in place; judicious use of bandages and

cold water, etc., may effect a cure. If the eye-ball is cold and has been hanging out for several hours, a cure cannot be effected, and the ball must be removed.

WARTS ON THE EYELIDS.

Warts are not uncommon on the cutaneous surface of the eyelids or on their border. They are very often of an encrusted nature and difficult to remove. If they have a neck it is best to remove them by excision or ligature; if broad in the base, strong acetic acid should be applied.

WOUNDS OF THE EYELIDS.

Wounds of the eyelids are to be treated on conservative principles; nothing must be destroyed; the edges are to be kept together by fine silver suture wire or silk. It is remarkable how little blemish will remain when they are brought together nicely. Zinc sulphate, five grains to the ounce of water, with a small quantity of opium, may be added.

MEMBRANE NICTITANS.

An inflammation of this membrane takes place at times, being manifested by redness and swelling. Use fomentations and apply zinc sulphate, grains forty; opium tr., ounces two; water, ounces eight.

Ulceration of this membrane is occasionally seen, and it becomes diseased to such an extent that it cannot be healed. When such is the case, it should be removed with the scissors, after having first secured the membrane with the tenaculum. It should never be removed except in cases where there is no alternative. Ignorant horsemen have from time immemorial removed this membrane for a disease they call hooks, which in reality was lockjaw. It has also been removed by some for every disease of the eye.

STRICTURE OF THE LACHRYMAL DUCT.

This is due to the thickening of its lining mucous membrane, from catarrh of the nose extending into the duct, or from the inflammation of glands. The tears flow over the side of the face, constituting what is termed watery eye. The common seat of stricture of the lachrymal duct appears to be at the superior part, and is best treated by syringing with cold water, from the puncta lachrymalis downward, or it may be necessary to dilate it. Treatment of this condition must be entrusted to the veterinary surgeon.

ECTROPIUM, OR EVERSION OF THE EYELID.

This is commonly seen in dogs as a result of distemper. The conjunctiva should be scraped and the nitrate of silver applied. When this fails it becomes necessary to excise an elliptical shaped portion of the conjunctival membrane, using the curved scissors for the purpose; after which use fomentations and use the remedy described for wounds of the eyelids.

ENTROPIUM, OR INVERSION OF THE LID.

This is exactly the opposite of ectropium, the eyelid being doubled in instead of outward.

Treatment.—Part of the eyelid skin must be removed, in order to remove the surplus, so that when the wound heals the lid will be retained in proper position.

XIX.

HERNIA.

Abdominal hernia, or ruptures, are classified as reducible, irriducible, and strangulated, according to their condition, and into inguinal, scrotal, ventral, umbilical, and diaphragmatic, according to their situation. A hernia may be defined to be a protrusion of the whole or part of an organ from its natural cavity.

INGUINAL HERNIA.

This form is most commonly met with in young animals and stallions. It consists of a passage of a portion of the intestines through the internal abdominal ring, and into the inguinal canal. Sometimes the intestine passes down and becomes strangulated, causing colicky pains. The animal rolls, gets up, and is all right; the intestine has returned to its place. There are usually no external signs of hernia of this description; it therefore requires a careful examination, with some knowledge of the anatomy of the parts, to diagnose it correctly. Castration tends to prevent it, by causing contraction of the inguinal canal.

SCROTAL HERNIA.

This form is not common among young animals; it is often congenital, being frequently seen at birth or soon after. In such cases it should be left alone, as it usually disappears in eight or nine months. Scrotal hernia will cause but little inconvenience unless it becomes strangulated.

Symptoms.—It is not always easy to distinguish scrotal enterocele from other swellings of the genitals, and particularly when the hernia is complicated with sarcocele or varicocele, a thickening of the cord, or a combination of these affections. If it is a

true hernia it will increase in size after a full meal. The examiner should take hold of the suspected mass, while an assistant coughs the animal. If it be a portion of the bowel, it will be drawn up when the animal coughs. If it be raised up with the hand, it sensibly diminishes in volume, from part of its contents being withdrawn into the abdomen, which retraction is sometimes attended with a gurgling sound.

Treatment.—The best method is to cast the animal, and by gentle manipulation return the intestine into the abdominal cavity. After which, take hold of the testicles and apply clams over the scrotum, close up, and allow the whole affection to slough off. This method has proven satisfactory in every case with myself. A good and very successful operation, known as the covered operation, must be entrusted with the veterinary surgeon. The operation is performed as follows: The skin and dartos muscle are to be carefully separated from the tunica reflexa until the hernial sack is fully exposed to view, and incision, sufficiently large to introduce the finger, is then to be carefully made into it. The hernial sack being exposed to view, the finger along with the bistoury should be passed into the opening and divide the structure. It, as a rule, will now pass back into its place; but if a large quantity of intestines are imprisoned, it will be necessary to enlarge the tunica reflexa, so that the bowel may be pulled out, gently unravelled, and returned. The return being effected, the scrotum, including the skin, cord, and tunicas are to be enclosed in a plain clam, which

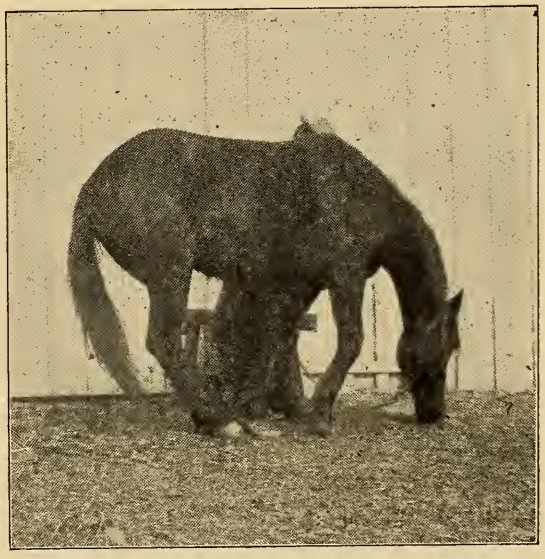


Fig. 73—Scrotal Hernia.

is to be left on until it sloughs. If a case of hernia is met with in a stallion, he should be cast, and the bowel returned; after which clams may be placed over the scrotum, beneath the testicle, and a portion of the scrotum allowed to slough off.

STRANGULATED HERNIA.

Strangulated hernia is where the intestine protrudes from the abdominal cavity; being compressed, the circulation is cut off, causing severe pain. The animal rolls, paws, and turns his head to the parts, in some cases almost touching the scrotum with his nose. Sweats break out over the body. See Fig. 73, page 279.

Treatment.—The animal should be cast and turned upon his back; the hind parts are to be elevated, and the parts manipulated. When gas is generated in the strangulated mass, it may become necessary to puncture with a small trocar before it can be returned. When returned the clams should be applied over the whole mass, and it allowed to slough off.

UMBILICAL HERNIA.

This form of hernia consists of the protrusion of a portion of the bowel through the umbilical opening. It is more frequently met with in young animals. The best method of treatment in this form of hernia is simply by taking the mass in the left hand, pressing the contents into the abdominal cavity, while the right hand surrounds it by a ligature placed as closely as possible to the abdominal parietes, and drawn sufficiently tight to cut off the circulation. On the third day a second cord should be tied around it. It will require a new cord every few days, which should always be tied above the preceding one. The whole mass will drop off, along with the tumor, in from ten to twelve days. No further treatment is necessary. The next best and most successful method is to cut into the hernial sack, scarify the edges of the abdominal opening, bring them together, secure in place with catgut sutures, and place a broad bandage around the whole body.

VENTRAL HERNIA.

This form is a protrusion of the bowels through an artificial opening in the abdomen. It may be small or large. It is generally caused by direct injury, as being gored, jumping fences, etc. In old animals hernia may occur in consequence of the abdominal muscles giving way without any apparent cause. The opening of abscesses in this region should be done with care, as hernia may exist with the abscess.

Treatment.—If small, it should not be interfered with. If it becomes strangulated, or any way interferes with the animal's usefulness, it may be removed. If it is small, the clams is the best method of treatment. If large, the best method is to cut into the abdominal wall, scarify the edges of the opening, bring them together, suture, and bandage.

DIAPHRAGMATIC HERNIA.

Here the bowels pass through the diaphragm into the thoracic cavity. This is very rare. It may be caused by severe exertions, or jumping, or drawing heavy loads.

Symptoms.—A difficult breathing, in addition to rolling and tumbling. The body becomes bathed with sweat. The pulse quick and weak; the ears, body, and extremities cold; death in a short time. It is very hard to distinguish this disease from spasmodic colic or enteritis.

Treatment is of no avail.

XX.

DISEASES OF THE HEAD AND NECK.

DISEASE OF THE EAR.

The ear of the horse seldom is the seat of any disease; the dog, however, is subject to well-known forms of disease of the ear—namely, internal and external canker. The horse sometimes suffers from an irritation of the ear, due to a parasite, or from eczema.

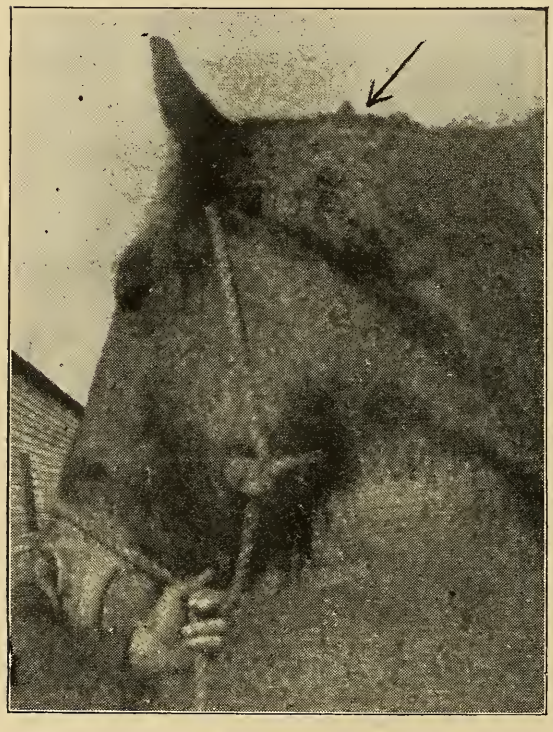


Fig. 74—Poll Evil.

POLL EVIL.

This is a fistulous ulcer situated on the supero-posterior portion of the cranium, immediately behind the ears of the horse, and is caused by accidental violence. At first a soft, fluctuating tumor is seen, surrounded by swelling and stiffness of the neck; soon the inflammation of the surrounding tissue subsides, leaving a prominent swelling—a serous abscess.

Treatment.—The trouble is seldom noticed in time to reduce the inflammation by applying cold water, and afterward iodine. It is generally noticed after pus has already formed. The abscess should be laid open at once, to the bottom, if possible, and the wound should be kept open for some time. Treat as an ordinary abscess. If the abscess has already burst, discharging a fetid, unhealthy pus, the disease will be found to have assumed a most formidable aspect.

The treatment of a case of this description is a matter of some difficulty. The sinuses must be probed into and laid open to their very base, and the whole dressed with a solution of the bichloride of mercury—mercury, four drachms; water, four ounces. The linings of the sinus will thus be destroyed and the whole converted into a common wound. Where there is but one sinus, and that a deep one, a seton may be inserted in the original opening and brought out on the side of the poll.

In some cases where neglected, the disease involves the synovial membrane of the occipito-atloidean articulation, causing anchylosis of the joint. In some cases it penetrates the capsules of the cervical vertebræ, causing sudden death by pressure upon the medulla spinatis.

FISTULOUS WITHERS.

Fistulous withers resembles poll evil in all particulars except its seat. It is caused by bruises from ill-fitting saddles. The

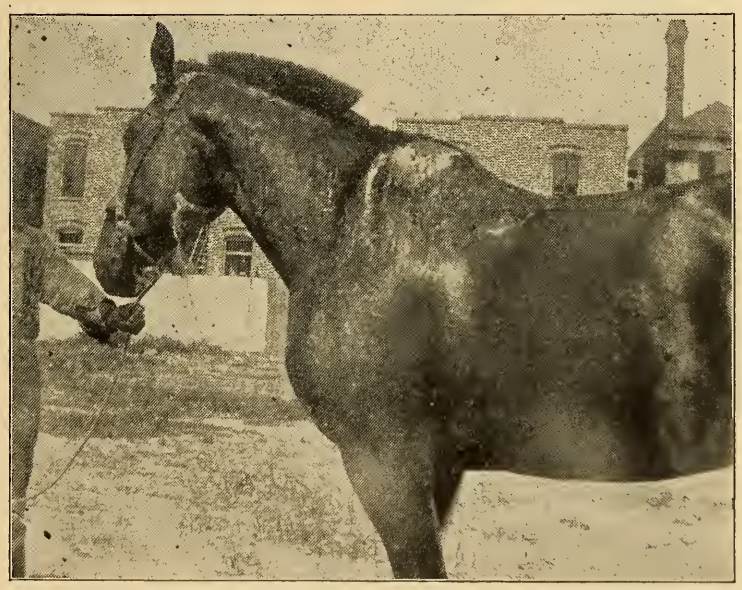


Fig. 75—Fistulous Withers.

treatment is the same as for poll evil—namely, to make a depending orifice for the drainage of the pus, and the sinuses laid open, or counter openings made by setons.

XXI.

DISEASES OF THE SKIN.

ERYTHEMA.

This consists of an inflammation of the outer layer of the dermis or skin, produced by mild irritating agents, such as rubifacents, or from inflammation depending upon constitutional disturbance. When present, there is a redness of the skin, with heat, swelling, and irritation. The causes are cold and heat operating alternately on the skin, friction, pressure, heredity, debility, plethora, and poverty. We have the acute and chronic forms. The chronic form is seen in long-standing cracked heels.

Fig. 76—Cracked Heels to the Extent of Sloughing.

CRACKED HEELS

Is very common among race horses of both classes, and is most frequently seen in the hind limbs. It is produced in a variety of ways, as washing the heels and not drying them properly, filthy stables, irregular exercise. A fruitful cause is perspiration collecting in the heels and in the flexures. Heat and cold will produce it. Washing the legs and not properly drying them is no doubt the chief cause.

Symptoms.—At first there will be a slightly reddened appearance of the heel. This is followed by a crack or fissure. The

animal will be stiff and walk in a peculiar, stiff manner. It sometimes takes on an odematous condition, extending as high as the hock.

Treatment.—Place the animal in a comfortable, loose box, and give rest. Give eight drachms of aloes. If the irritation is severe, poultices should be used; they prove very beneficial by softening the parts and bringing about a healthy action. Glycerine should be applied on the heels on going out and a poultice on coming in. A lotion of sulphate of zinc, six drachms, one ounce of sugar of lead, to a quart of water may be used. Carbolic acid, one part of acid to twenty parts of water, is beneficial.

The acute forms of erythema are often witnessed in prolonged wet weather, involving the limbs to a certain extent; sometimes all four legs, arms, thighs, and abdomen are covered by patches of superficial inflammation.

MUD FEVER.

Its cause is similar to cracked heel, as wet, dirt, washing the legs. It is generally seen in the winter and spring months.

Symptoms.—There will be discovered a superficial inflammation of the skin. The pain is severe, the hair loses its connection, coming off in patches. Suppuration sometimes takes place in the flexures of the knee, hock, and pasterns. The appetite is affected, the pulse runs up, and there may be some rise in temperature.

Treatment.—Give six drachms of aloes internally, and apply the zinc, lead and acid lotion to the parts externally. Carbolic lotion, one to twenty, may be used. The zinc and lead lotion previously referred to is highly beneficial.

HERPES.

This disease is expressed by patches of irregular form and variable size, upon each of which there arises groups of vesicles. The vesicles are larger than those of eczema, and contain a milky substance. It is generally confined to the lips, but may involve

the whole body. It is noticed at the convalescent stage of influenza. It is due to some changed condition of the blood.

Symptoms.—A reddened appearance of the skin; the hair falls off in patches. There will be an increase in temperature as well as an increase in the pulse.

Treatment.—For this and all other skin diseases, where an astringent and antiseptic is needed, the zinc, lead and acid lotion is superior to others. Zinc sulphate, one ounce to a quart of water, is useful. The carbolic acid lotion may be used with good results.

URTICARIA—NETTLE RASH, SURFEIT.

This is a frequent form of skin disease in the horse, and consists of small, elastic eminences, varying in size and shape, and attended with itching. The lumps rise quickly, and may be seen over the whole body. They disappear as quickly as they come. It is seen most frequently in the summer months, when the animal is changing its coat. It is caused by some disorder of the digestive apparatus. A sudden change of diet will frequently produce it. Large draughts of cold water may produce it.

Treatment.—A mild purgative, six drachms of aloes, as a rule, is all that is necessary to give. If there is much irritation and itching the zinc, lead and acid lotion should be used.

SIMPLE ECZEMA.

This disease is very common in the horse. No doubt more horses suffer from eczema than from all other skin diseases combined. It is seen more frequently in the summer months. Simple eczema is a non-contagious disease of the skin, characterized by the formation of a small pimple, which subsequently becomes a vesicle and ultimately a pustule.

Cause.—A changed condition of the blood, or a change in the weather. Certain foods produce it, as barley, a run at grass. It is thought that ripe grasses will produce it. It is due to some

constitutional disturbance. I do not believe that it can be produced by the application of irritants, as is generally supposed.

Symptoms.—It usually comes on suddenly, and is manifested by itchiness, which causes the animal to rub and bite itself until the hair and cuticle are brought off, leaving the skin red, raw, and inflamed. Excessive crops of vesicles develop themselves, dry on the sore skin, or discharge a fluid which seems to cause a distention of the disorder.

Treatment.—Both local and constitutional remedies must be employed in the treatment of this disease, and it is difficult to treat. Six drachms of aloes should be given and followed by potassium nitrate, one-half ounce; sweet spirits nitre, one ounce. This must be given in a drench; two or three doses may be given. The animal should be dieted. Use the zinc lead and acid lotion. Acid hydro-cyanic, a half ounce; aqua, eight ounces, may be used locally to the parts. Arsenite of potash should be given, and is to be prepared as follows: Acid arsenious, one drachm; potassium carbonate, one drachm; aqua, twelve drachms; mix and boil slowly until the arsenic is dissolved, and strain when cold. Each ounce of the solution contains five grains of arsenic. The dose is from a half ounce to an ounce of the liquor. Fowler's solution of arsenic may be tried. Acid carbolic, one to sixteen, is a good local remedy. The local treatment should be frequently changed. A very good lotion consists of corrosive sublimate, two drachms; spirits of wine, four ounces; aqua, one pint.

MALLENDERS.

This is an eczematous condition, and occurs in the flexures of the knee-joints, causing a scurfiness and dryness of the part. It occurs more frequently among heavy horses, and in stallions more frequently than mares or geldings.

Cause.—Sluggish circulation, irregular exercise, stimulating food, or from the effects of a vesicant.

Symptoms.—Redness and a discharge of serous character takes place. Cracks appear, and the case may take on a chronic form.

The treatment is both local and constitutional, and is difficult. Eight drachms of aloes should be given, followed by potassium nitrate, a half ounce, sweet spirits of nitre, one ounce. Fomentations should be used. As a local application, corrosive sublimate is useful; it should be used in the proportion of two drachms of sublimate to four ounces of water. The iodide of potash compound is of service. Tincture of opium and glycerine make a good mixture to allay the irritation of the parts.

SALLENDERS.

This condition occurs in the flexures of the hock, and is the same condition as mallenders. The pathology, symptoms, and treatment are the same.

PRURIGO OR PRURITIS—RUBBING THE TAIL.

This is a disordered condition of the skin, caused by functural derangement of the nerves of the part. Is seen about the roots of the tail and mane. The condition is hard to cure.

Cause.—Irregular exercise and generous feeding are probably the most usual causes. It is seen most frequently during the hot months.

Symptoms.—Rubbing the mane and tail are the symptoms. The treatment consists of cleansing the parts thoroughly with warm water, and applying potassium liquor, two drachms; hydrocyanic acid, one drachm; aqua, two pints, to the irritated parts of the skin. In case the animal is a valuable stallion kept in a loose box, a bar of wood should be placed around the box in such a manner as to reach just above the hocks; this will prevent him rubbing the tail. The tail may be protected by a strong leather band securely fastened. The rubbing may be due to the worms ascarides in the rectum. The method of removing them will be given later. There is no doubt that prurites becomes a habit with some horses.

GREASE

Is a disease showing itself in connection with the heels of a horse. It is of an eczematous nature, and is known as grease on account of its peculiar oily or greasy discharge. There is a superficial inflammation, which extends and involves the hair follicles and sebaceous glands. It is seen principally in heavy horses, and is worse in some climates than in others. The causes of grease are predisposing and exciting. Heavy breeds are predisposed, as well as horses having flat feet and large quantities of hair on the limbs. The exciting cause is washing too frequently without drying. Cracked heels often terminate in grease, and are caused by the same influence which produces grease.

Fig. 77—Grease, terminating in Elephantiasis.

Symptoms.—Swelling, accompanied with a slight discharge. Soon this discharge becomes of an oily character and the hair comes out. On first coming out of the stable, the animal walks very gingerly, but soon warms up and goes all right. When the papilla becomes enlarged there is usually a very offensive odor accompanying it. It is then known as the grapous stage. There is generally well-marked fever present. Grease, if neglected, may terminate in elephantiasis.

TREATMENT.—Clip the hair from the parts and use the zinc lead and acid lotion. It is a mistake to use powerful remedies at first. Carbolic acid in its undiluted state should be applied thoroughly to the parts, and the zinc and lead lotion used for a few days, when the acid should be applied again as stated before. It should never be used more than twice in its undiluted form. Charcoal should be used to destroy the odor. Solutions of carbolic acid, one to sixteen, may be applied for this purpose. When grapes are present they should be removed by the actual cautery, it being more effectual than caustics. To do this requires two irons, one hot and the other cold. The cold iron is to be placed so as to protect the healthy structures, while the hot one removes the grapes. A very useful application to greasy and cracked heels is found in the benzoated oxide of zinc ointment. It may result in ulcers at the heel, which should be removed by caustics, such as caustic potash and poultices. The constitutional treatment consists of eight drachms of aloes, given at the outset of the disease, and when the cathartic acts, give arsenic and iron—five grains of arsenic to two drachms of sulphate of iron. Give twice a day in feed.

RAT TAILS.

This is an inflamed condition of the dermis. There is an exudate, the papillary layer of the skin becomes enlarged, showing transverse ridges resembling rat tails. It is generally seen in the hind limb, and is a result of grease.

TREATMENT.—Purgative, and use the zinc lead and acid lotion externally.

CRUSTA LABIALIS.

This is an eczematous condition, and is said to be due to the actions of grasses in the pastures. I am inclined to think that it is caused by some derangement of the digestive organs.

TREATMENT.—Use the carbolic acid lotion, or the zinc lotion, or lead lotion. They are all good remedies.

ECTHEMA.

This condition is an eruptive pustular disease. It is said to be contagious. It is sometimes called the American skin disease of horses.

It is characterized by medium sized, hard pustules over the body. These pustules finally burst, and discharge a thin, sticky fluid of the color of straw. Finally an unhealthy-looking scab forms, which drops off in time, leaving a cicatrice.

Treatment.—Give six drachms of aloes, and follow with potassium nitrate, one-half ounce; sweet spirits of nitre, one ounce. Several doses of the latter may be given. Locally the carbolic acid lotion should be used. The different other preparations referred to under the head of skin disease may be used.

MANGE.

This disease is also called scabies. It is due to an animal parasite belonging to the family of sarcoptes. They burrow in the flesh, and occur in the horse, man, sheep, pigs, and cattle. Besides the sarcoptes, there is a parasite known as the dermatodectes. They simply hold on to and prick the skin. Another variety is known as symbrotes; they neither burrow nor prick the skin, but cause considerable irritation, and are common to the horse and ox. The above mentioned parasites are those causing mange, although of the three varieties named the sarcoptes is probably the one oftenest met with in mange. They may be carried from one animal to another by means of the harness, saddle, or clothing. The disease is not frequently met with on the American Continent, and the parasites causing mange are not spontaneously generated. At the same time, it should be remembered that dirty and badly kept animals are more prone to receive the parasites, and offer better advantages for their production.

Symptoms.—If sarcoptes be present there will be vesicular eruptions and intense itching, which increases towards night.

This pruritis is supposed to be due to an acrid fluid which the parasites deposit in the gallery in which it is lodged. This form of mange is seen, as a rule, on the sides of the neck and withers, and thence may extend over the entire body. Small, hard pimples may be felt which contain a scab, which can be easily removed, exposing a surface an eighth of an inch in diameter. Large surfaces become destitute of hair in the advanced stage. The skin takes on the appearance of the rhinoceros.

The symptoms of the presence of the dermatodectes are characterized by great itching, with the formation of pustules, an eighth of an inch in height, soon forming a vesicle, which ruptures and allows the serous contents to escape; these dry and form a crust. These parasites are found at the upper border of the neck and root of the tail; they spread more slowly and are easier to cure than the sarcoptes.

The symptoms of symbiates are a production of serum, which forms into numerous crusts that break in large flakes. They do not produce the same amount of itching as the other forms. They are found on the limbs of horses, and merely bite the skin.

Treatment of Mange.—First wash the animal thoroughly with warm water and soft soap. The destruction is then to be effected by applying carbolic acid, one part to sixteen of water. This should only be applied on a part of the body at a time. It is a good practice to have the animal clipped before making the application. Solutions of the iodide of potassium and of the iodide of sulphur have proven a most effective remedy, in proportions of one ounce of iodide to eight of sulphur. Sulphur and lard have been used with good results—one ounce of sulphur to three or four ounces of lard. Staphisagria seeds, four ounces; water, one gallon, boiled until the residue measures two quarts, and applied to the skin as hot as can be borne is a most effectual remedy. Mange in cattle and dogs will be dealt with in the chapters on dogs and cattle.

RINGWORM.

This disease is due to a parasite belonging to the crytogama, or vegetable kingdom. It is contagious; attacks animals, and is communicated from one to another, and from animals to man.

Symptoms.—Small pimples appear on various parts of the body. After some time the hair begins to fall out in circular patches, and unless stopped the patches soon spread over the entire body. Its favorite seat is on the hind quarters, back and neck. It is accompanied by slight itchiness.

Treatment.—First remove the crusts by washing the parts with warm water and soft soap. Apply to the parts the carbonate of potash or the iodine ointment—iodi potass. iodi ā ā, one drachm; adeps, one ounce. The carbolic acid lotion may be used. Nitrate of silver, twenty grains to a pint of water, may be used.

LICE

Are seen in poor, uncared for, half-starved animals and in very old animals. The treatment is to clip the animal and wash with a decoction of stavesacre, one ounce of the powdered seeds to a pint of water. Carbolic acid lotion, used in the same proportion as recommended for mange, is an effectual remedy.

POULTRY LICE.

These lice sometimes get on horses and cows, causing great itching, the animal scarcely being quiet for a moment. He rubs against everything near him. At night his torments increase. A horse infested with these lice will fall off in appetite and grow thin.

Treatment.—Treat as for horse lice, and whitewash the stables.

FLEA.

Where the animal is infested with fleas, it should be dusted with the Persian insect powder. Attention should be paid to cleanliness.

TICKS.

They are seen in horses, cattle, sheep, and dogs. Their mouths are in the form of a sucker, and they attach themselves so firmly that they cannot be removed without tearing away the skin. They generally attach themselves to the parts least covered with hair. To remove them, their bodies must be cut off by sharp scissors, or kill them with the oil of turpentine. They multiply rapidly in hot climates, particularly in low lands or tidewater counties.

FLY.

A small fly resembling the house fly often proves a great source of trouble among horses and cattle during the months of August and September. They are longer and slimmer than the common house fly. They are most abundant in low, wet places.

TREATMENT.—Use the carbolic acid lotion; keep the animal in during the day. Preparations containing tar should be used.

BOT FLIES.

Bot fly eggs are deposited in the skin, and are there developed into the larva of the fly. The bot of the ox is a large species. They form tumors on the backs of cows and oxen as large as a partridge egg. When the egg is deposited it is attended with severe suffering, causing the cattle to run wild and furious and stray from the pastures. They will run bellowing from the rest of the herd to brush or water. The tail from the severe pain is held with a tremulous motion straight from the body, and the head and neck stretched out to the utmost. If the larva be removed from its nest it will be seen to be of a white and almost transparent color. When it has attained its full growth it works its way out and drops to the ground, and ultimately becomes a fly. Bots are found in other animals, and are said to exist in man.

XXII.

DISEASES OF THE VEINS AND ARTERIES.

INFLAMMATION OF THE JUGULAR VEIN.

This occurs as a sequel to bleeding. It is characterized by a reddening of all its coats, an exudation pours out from the coats of the vein, which along with its contents forms a solid coagulum or clot. At first the clot is but loosely attached to the interior of the vessel, but soon it becomes more strongly adherent, the surrounding areolar tissue is infiltrated with serum, and that in contact with the vein, adherent to it, by a fibrinous exudate. Generally a swelling appears along the course of the coagulum, in which fluctuation can be detected similar to any other abscess. The pus is confined above and below by the coagulum. If the vein is manipulated on its course towards the head, it will be found to be considerably thickened. The swelling extends towards the head.

Treatment.—Apply a cantharides blister to the part. If abscesses have formed, they must be opened before the blister is applied. Inflammation of the jugular always terminates in the permanent closure of the vessel.

THROMBUS.

This disease is produced through improper closure of the wound after bleeding.

Symptoms.—Swelling in the neighborhood of the wound. The swelling is caused by the exudation of a small amount of blood into the areolar tissue. The exudation is from the jugular vein, and takes place in about twenty-four hours after the operation.

Treatment.—Tie the head to the rack, and apply a sponge saturated with cold water to the parts.

VARICOSE VEINS

Are seldom seen in the lower animals. I have seen the condition in horses and cattle. The treatment is pressure to the parts. If an abscess should form, it should be opened and a blister applied. The cantharides blister is the best in this case.

VEIN STONES.

Concretions have been seen in dilated veins of the neck and other parts.

ENTRANCE OF AIR INTO VEINS.

Air rapidly injected into the veins causes immediate death. The animal is suddenly seized with symptoms of faintness and convulsive breathing; falls and perhaps immediately dies. If only a small quantity enters the vein the animal may rally. This subject has been carefully investigated. and it behooves the operator to be careful when bleeding.

INFLAMMATION OF THE ARTERIES.

This is a rare affection in the lower animals, but is occasionally seen. Inflammation of the artery is caused by an injury. Exudation from the walls of the inflamed vessels form a clot, composed of lymph and coagulated blood, which plugs the artery. The symptoms of plugging of the external iliacs are coldness of the extremities, with muscular debility, which increases with exercise. The diagnostic sign is absence of pulsation in the artery, detectible by examination per rectum. The animal suffers great pain, the limb is deathly cold, and perspiration breaks out over the body. He may suddenly recover and appear all right, but may be affected again at any time. If the circulation is completely cut off, death will take place.

Treatment.—Apply hot fomentations to the parts. Hot liniment may be applied with smart friction. If the limb remains cold after this treatment has been employed, it may be ascer-

tained that the circulation of blood through the part is obstructed.

ANEURISM.

Aneurism is a tumor produced by the dilation of an artery. When all the coats of the artery are dilated and form a pouch, it is known as true aneurism. Rupture of the inner coat, while the two outer coats remain uninjured, constitute a false aneurism. When the outer coats are ruptured, and the inner coat remains uninjured, it is known as hernial aneurism. A dissecting aneurism is where a separation of two of the coats of the artery takes place. The blood flows between the separated coats and gradually dissects one coat from the other.

Treatment.—If the aneurism can be got at, it should be cut down upon, the artery ligatured, and the aneurism dissected out.

XXIII.

LYMPHATICS.

LYMPHANGITIS, OR INFLAMMATION OF THE LYMPHATICS.

Lymphangitis is known by a variety of names, as Monday morning disease, weed, etc. It is an inflammation of the absorbents, usually confined to the extremities and to one hind leg. It is met with more frequently in the heavy breeds.

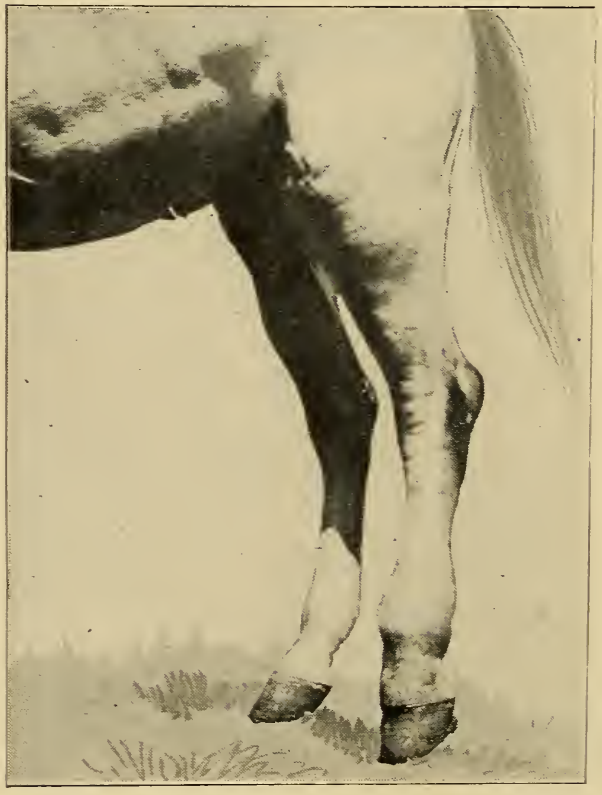


Fig. 78—Lymphangitis.

Cause.—The usual cause is from improper feeding, as when an animal, having been worked regularly, is lain off work for a few days and receives the same quantity of food as when working. The horse's food should be reduced while resting. Injury as wounds or kicks will also produce it.

Symptoms.—The local inflammation is generally preceded by rigors, which are sometimes very severe. The mouth is hot, the pulse hard and strong. The visible mucous membranes are injected, and there is an increase in respiration. The bowels will be constipated and the urine highly colored. The swelling first

appears on the inside of the thigh and extends downward. The lymphatic glands are enlarged. There will be strong desire for water. If a case be neglected, it will result in elephantiasis.

TREATMENT.—Give eight drachms of aloes. When the purgative has acted, a diuretic should be given—potassium nitrate, a half ounce; sweet spirits of nitre, one ounce. This may be repeated three times a day for three or four days. Tincture of aconite, twenty drops every four hours, should be given. The limb should be thoroughly fomented with warm water three times a day. After fomenting the limb should be dried and wrapped in cloths in order to retain the heat. Belladonna plasters are good to relieve pain.

ELEPHANTIASIS.

This condition is caused by repeated attacks of lymphangitis. The areolar tissue becomes thickened at each attack; new blood vessels and nerves are formed through the new structure, constituting the condition known as elephantiasis. When an animal once suffers from an attack of lymphangitis, he is more liable to succeeding attacks.

TREATMENT.—It cannot be cured, but cold water may have a beneficial effect.

XXIV.

DISEASES OF THE MALE ORGANS OF GENERATION.

ORCHITIS

Is an inflammation of the testicle. It is a very serious condition, but not frequently met with. It is generally caused by direct injury, as blows, kicks while covering mares.

Symptoms.—There will be great pain manifested, the pulse being full and bounding. The parts are greatly swollen. The animal may lie down and attempt to roll. He expresses his pain by frequent groans, and experiences great difficulty in walking.

Treatment.—Bathe the testicle with warm water for an hour at a time, using a soft sponge. Give eight drachms of aloes. The testicle must be supported by means of a suspensory bandage padded with cotton. This should be kept moist by warm water. The tincture of opium or belladonna should be applied locally to allay pain. If an exudate remains after the inflammation subsides, it may be absorbed by administering two drachm doses of the iodide of potash. It may be necessary in some cases to apply a stimulant or blister.

HYDROCELE,

Or dropsy of the scrotum, is rarely met with. It may result from orchitis.

Treatment.—Apply iodine and lard—two drachms of iodine to two ounces of lard. If there is much serum it should be drawn off with a small trocar and canua. Iodide of potash should be given internally, in two-drachm doses, three times a day.

PHYMOSIS,

A morbid condition of the sheath, which, from contraction of the orifice, prevents the exit of the penis. This is seen more

particularly in geldings. It is due to injury of some kind, and may be produced from the habit of not properly protruding the penis while urinating.

TREATMENT.—Foment the parts with warm water and scarify. Give internally potassium nitrate, one-half ounce; sweet spirits of nitre, one ounce. In some cases it may be necessary to enlarge the prepuce or remove warts.

PARAPHYMOSIS.

The penis protrudes in paraphymosis, and cannot be drawn within the sheath. It may arise from a weakened condition of the penis, or from direct injury, too frequent coition, etc.

TREATMENT.—If it results from paralysis, amputation is the only remedy. When it is caused by debility or injury, it should be treated with a view of returning it. If there is much swelling, it should be scarified and placed in a suspensory bandage. Apply fomentations, as cold water. It becomes necessary in some cases to puncture the sheath to prevent strangulating the penis.

AMPUTATION OF THE PENIS.

It becomes necessary in some instances to amputate the penis. This operation will require the employment of a surgeon. The animal should be cast and chloroform administered. A catheter should be introduced into the urethra and held in position by passing a ligature around the penis an inch above the intended incision. The penis should now be removed by a bold incision and the arteries ligatured. The ecraseur is a very good instrument for removing the penis. The catheter should be allowed to remain in the urethra until it partly heals, in order to prevent closing of the urethra by cicatrization. The wound should be dressed with the zinc, lead, acid lotion. Various kinds of growths occur in connection with the penis. They should be removed and the parts touched with a pencil of nitrate of silver,

EXCORIATION OF THE PENIS

May occur, and is generally due, to direct injury, such as may result from a large horse covering a small mare, especially a mare that has never been served before. It may be caused by putting the horse to the mare too soon after foaling, the usual discharge after foaling causing excoriation.

TREATMENT.—The animal should serve no mares until recovery. The penis should be dressed with a lotion of tincture of opium and zinc sulphate—two ounces of opium, one ounce of zinc, to a quart of water.

URETHRITIS.

Inflammation of the urethra is caused in a number of ways, as the presence of calculus, exposure to cold, injury.

SYMPTOMS.—The animal shows pain when urinating, and does not retract the penis for some time after act is completed. If examined, the urethra will be found to be reddened and irritable.

TREATMENT.—Give eight drachms of aloes. The urethra should be injected with zinc sulphate, four drachms; water, one pint. The injection should be made twice a day with a syringe.

Ulceration of the urethra may occur by an injury inflicted, sometimes causing a fistula. The parts should be kept clean, the edges of the opening should be scarified, brought together by means of sutures, and some of the other lotions previously mentioned for healing applied. If the wound is indolent it should be touched occasionally with the nitrate of silver.

VARIOLA.

This disease may occur in connection with the penis, and may be transmitted during coition from one animal to another. The animal should not be allowed to copulate when suffering from any irritation in connection with the generative system. Coition will retard the healing process.

MALADIE DU COIT.

We have in the lower animals a disease called Maladie du Coit. It occurs both in the malignant and non-malignant forms. The disease results from the act of copulation, and is similar to syphilis in man. It is a contagious disease. The symptoms of the disease in the benign form are similar to those presented at the period of œstrum. They appear in a few days after copulation. The mare strikes the ground with the hind feet, whisks the tail, and urinates frequently in small quantities. A discharge takes place, and is soon followed by ulcers. A peculiar feature in the disease is that the symptoms are not presented in the horse for months, and are then only shown by an odematous engorgement of the sheath. In the malignant form the symptoms in the mare are the same as those of the benign form, only are more severe. Those of the horse are similar also. The disease was first seen in Russia in 1796; since then it has found its way into Africa, America, Egypt, and the majority of the European countries.

Treatment.—Turpentine is recommended to be given every other morning in a drench. Arsenic and iron are recommended very highly. Locally, astringents are to be used. The carbolic acid lotion may be used—sulphate of zinc, one ounce; water, one pint.

CASTRATION.

The colt should be castrated as soon as the testicle can be easily reached. It may be performed at any period of life, but is attended with less danger in young than in older animals. A period between twelve months and two years of age is generally preferred. I have operated on colts from two weeks up, and my experience has been that the earlier in life it is performed the better. It is less painful to the animal when young, but more troublesome to the operator, the testicle being harder to get hold of.

SEASON.

When possible to choose the season most favorable for the operation, the spring and fall should have preference. Yet I have castrated every month in the year, and operated on old stallions in the month of August after finishing the season in the stud, with seemingly as good results as in the spring and fall. The origling should have the preference of the season. The months of May and June and October and November should be set aside for this work.

RESTRAINT.

There are two modes of restraint in securing the animal during the manipulation and removal of the testicle. The first mode is by keeping the animal quiet by means of a twich, and allowing him to remain in the standing posture while operating. The second mode is by throwing, with the ordinary side line, and drawing one foot up and tying. The method of throwing is the safest for all parties engaged. The horses injured by throwing are few. I have castrated over four thousand straight colts and old horses without a single accident or death resulting from the operation. Should hernia be present after castration, or follow the operation while in the standing posture, death of the animal would likely result. The manipulation for hernia cannot be properly made while standing.

SIDELINES AND HOBBLING.

Casting.—There are two methods in ordinary use—one by side lines and one by hobbles. Casting by side lines is the method chiefly employed for young animals, and in cases where the animal does not need to be closely confined. It is done by means of an inch rope fifty feet long, doubled, and the doubled end tied in a firm knot, having a loop about two feet in length. Prepare a bed of straw, and apply a twich to the horse's nose. Fasten a small rope or surcingle around his chest, as seen in

Figure 79. The loop in the side line is passed over the animal's head, on to the neck, like a collar with the knot undermost. The two ends of the rope should be then taken up by the operator and his assistant, and both at the same time should pass the ends of the rope back through the forelegs. One end is taken to the outside of the near hind leg, below the hock, passed around to the inside under itself, and up to the neck loop and passed through it. The other is taken to the outside of the off hind leg, passed round to the inside under itself, and up to the neck loop

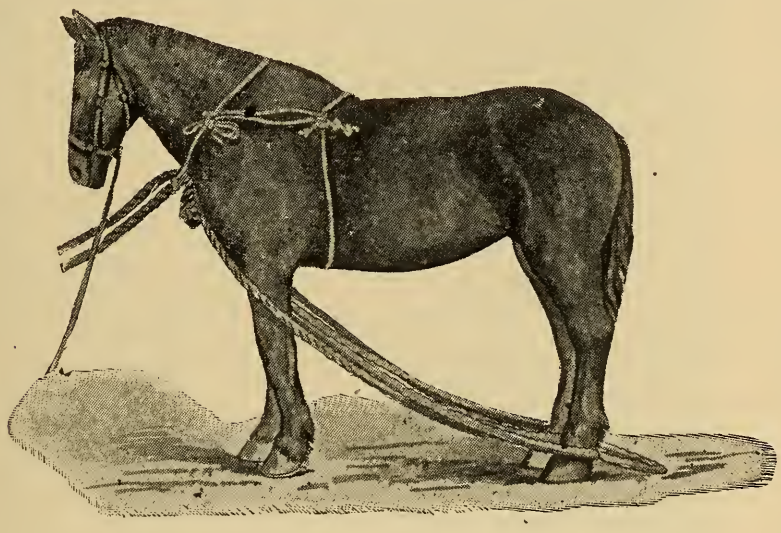


Fig. 79—Casting with Sidelines.

and passed through. Two or three men then lay hold of the free end of the near rope and stand by the near quarter of the animal. Other two or three men lay hold of the off rope, and stand in front. The twitch may now be removed, and the man standing at the side free from the ropes grasp the bridle, pull him to the ground as all the men quickly pull the ropes, and drop him on his hind quarters. The animal being down, both legs should be drawn up near the neck. The rope is to be fastened around the fetlock and a hitch drawn over the foot on to the fetlock, and pulled tight. The fore foot may then be included in the tie, and a similar process gone through with on the legs of the opposite side.

Hobbles.—Hobbles are obtained like those shown in Fig. 80. They are simply four leather straps with buckles. Three of them have an iron link at either end. The fourth one, the main hobble, has, in addition to the link, a socket for a screw bolt called the key, with which to secure the chain. A chain about ten feet long, capable of passing easily through the links, should be obtained. Its first sixteen links should be sufficiently large to allow the insertion of the key, and on its first link having at-

Fig. 80—Casting with Hobbles.

tached a screwed socket fitted to the space. To the other end of the chain is attached a strong rope about ten feet long. The animal is to be led on the bed prepared and twiched. If the animal is to be cast on the off side, a rope should be looped around the near fore arm and passed to the off side to be held by an assistant. The main hobble is applied to the near fore pastern, and the other straps to the other pasterns. Care should be taken that the buckles are to the outside, the points of the straps of the fore buckles pointing backwards, and the points of the straps of the hind ones pointing forward. The assistant at the main

hobble passes through its projecting link the end of the chain, which is then passed from the inside through the link of the off fore hobble, and from the outside through the link of the off hind hobble, and from the inside through the link of the near hind hobble, and up again to the main hobble, and screwed end secured in the space by the key. One or two men lay hold of the rope across his back, and three or four men lay hold of the free end of the rope and chain, and at a given signal all pull. The animal's fore legs are thus drawn together and he is pulled over by the men holding to the rope that crosses his back. The chain is drawn as tight as possible, and the key into the last link of the chain passed through the link of the main hobble, and then screwed up to prevent it slipping. It is unloosed by simply unscrewing the key and removal of the straps.

ANATOMY.

It is necessary that the operator understand the anatomy of the parts. As such cannot be given in this work, the reader must gain the knowledge by works on anatomy. The principal parts met with, however, will be pointed out.

The testicular envelopes, passing from without inward, are represented by the scrotum, the dartos, the cellular coat, the tunica erythrodia, formed by the cremaster, and the fibrous and serous or vaginal sac. The scrotum is a continuation of the skin, and forms a complete bag, common to both testicles, which it contains and covers. It is divided into two lateral halves by a raphe or median line. It easily contracts to its shrunken condition, and may be closely drawn up into the inguinal canal.

The second envelope, the dartos, is a prolongation of the tunica abdominalis, and is a yellow, fibrous structure, forming two distinct sacs resting upon each other, and lying on the inside of the scrotum, to which it is intimately adherent.

The next envelope is represented by the tunica erythrodia, which is the cremaster muscle, and from the lumbar region extends itself downwards into the inguinal canal, along the outside

of the cord, and terminates towards the superior part of the testicles in fibers extending only over its external surface. This muscle rests on the fibrous coat, another envelope, of the testicle and cord. This muscle sometimes gives the operator some trouble in young colts, as it has the power of retracting and carrying the testicle into the depth of the groin.

The fibrous testicular envelope, just referred to, giving attachment to the cremaster, is a thin membranous bag, elongated like the neck of a bottle around the spermatic cord which it envelops, and dilated below, in order to enclose the testicle. Adhering to this coat internally is the serous coat. This last membrane is a duplicate of the peritoneum.

The testicles are suspended at the end of the spermatic cord, and surmounted upon their superior border by the epididymis, the first part of the deferent canal, which is folded upon itself. This conveys the products of the secretion of the testicle into the vesiculæ seminales, lodged in the pelvic cavity. The spermatic cord is formed by the spermatic artery, the deferent canal, and the circumvolutions of the small testicular artery.

METHODS.

The methods have been numerous. I shall simply refer to the older and dwell more largely on the more recent ones.

SIMPLE EXCISION.

This is one of the oldest modes of operation, and though to a great extent discarded, still finds its application in the smaller animals.

SCRAPING.

This operation is said to have originated in India. It is but a modification of the preceding method, the only difference being the use of a dull knife instead of a sharp one to separate the coats of the artery.

TEARING AND TORSION.

These two methods are similar. In tearing, the cord was subjected to a certain amount of torsion by the hand, and then torn apart at a given point in its length, while in simple torsion we divide the cord by twisting it with instruments.

FREE TORSION.

This is where the band alone is employed in the operation.

LIMITED TORSION.

Limited torsion is the operation by which the division of the spermatic cord is effected by torsion made upon a given point, and limited by special instruments. Operation by the instruments was first introduced in 1883 by two French veterinarians.

LINEAR CRUSHING.

The ecraseur was brought into use by Mr. H. Bouley in the year 1857. It is the best method of operation known, and is more surgical than any other methods. The function of the instrument is to effect the division of living parts without hemorrhage. The original ecraseur has received many improvements. The essential design is to produce a general constriction of the blood vessels, by which, their internal and middle coats being first divided, they may contract within the cavity of the vessel in such a manner as to close their cavity and form a sort of stopper to the artery.

The operation is comparatively a very simple one. Take a firm hold of the testicle with the left hand, if the operator be right-handed, and with a bold stroke make an incision through the coverings of the testicle. The testicle being exposed, the chain of the instrument is to be placed around the cord, well up; the contraction of the chain, as it divides the tissues, should be slow. Several seconds should elapse between each rotation of the wheel. This divides the tissues in a proper manner. The animal is then set at liberty.

FIRING.

This mode of castration consists in applying to the cut end of the testicular cord an iron heated to a white heat, the actual cautery. This is one of the oldest methods of operating, and is a good one. The cord may be severed with the hot iron. A clamp is placed on the artery just above where it is to be burnt off.

THE METHOD BY THE CLAMPS.

This is an ancient mode of operating, having been transmitted to us through many ages. I think this a good method of castration when hernia is present; but for ordinary castration, it has its objections. The removal of the clamps after the operation is a source of trouble, and besides it frequently is accompanied with hemorrhage. There is a possibility of the animal running into brush and tearing off the clamps. And then the weight of the clamps often causes champignon, a condition which I have never seen follow an operation with the ecraseur, or by ligature. The method of operation has been described in the chapter on hernia.

THE LIGATURE.

This method of castration consists in the application of a circular ligature upon the entire cord, or a portion of it, for the purpose of completely closing it and the various parts entering into its formation. This method was practiced as far back as 1734. The operation has several varieties—that of the cord with its envelopes; that of the cord only, either by the covered or uncovered method; that of the spermatic artery alone; that of the efferent canal, and that by the subcutaneous process. Among all methods of castration by ligature, none of them has been subjected to sufficient practical test such as would justify a strong recommendation or unqualified approval.

CRUSHING OF THE TESTICULAR CORD.

This consists of crushing the spermatic cord with a hammer; the vessel continuing, meanwhile, to be covered with its envelopes. It was first used in the year 1826, and is most commonly practiced in some French districts.

DOUBLE SUBCUTANEOUS TORSION.

This method is practiced in the southern part of France. The position of the testicle is so changed that its lower extremity is made to take the place of the upper, the cord is subject to a certain degree of tortion, and then the testicle is restored to its normal position, to undergo a process of atrophy which destroys its power of secretion by physiological action. The operation is much easier performed in ruminants than in solipeds.

CASTRATION OF CHRIPTORCHIDES.

The abnormal development of animals in which the testicles have failed to make their appearance by descending through the inguinal canal into the bags, is quite commonly met with in horses, the animal being then known as a ridgling, or original. The testicle may be found in the inguinal canal, or only remaining close to its superior opening, or floating in the abdominal cavity.

MODE OF OPERATION.

I will here give my method of operating, as it may be of interest to the reader. This operation requires a thorough knowledge of the anatomy of the parts, which can only be obtained by dissection. No one should attempt the operation unless thoroughly familiar with the parts.

The animal should be cast with the side lines and both hind feet tied to the fore ones. Place the animal on his back, make an incision about six inches long in the scrotum where the testicle is normally situated. Then divide the second layer of the cover-

ings of the testicle, the dartos. Care should be taken in doing this to avoid the large venous branches which abound in the region. If these veins be cut the blood will interfere with the operation. Next tear the loose cellular tissue, that lies immediately under the dartos, with the fingers until the ring is felt. Now introduce the hand into the inguinal canal, and separate it as much as possible by passing the finger around the external surface. The opening is made lengthwise and of sufficient width to allow of the passage of the testicle. When situated high up in the ring, it is frequently difficult to grasp it and keep it sufficiently steady in position to permit the free use of the bistoury. The testicle should be gently drawn out and removed with the ecraseur. If the testicle is found to be in the abdominal cavity the surgeon should introduce his hand, with the fingers united in the form of a cone, into the external inguinal ring, and carefully force them upward towards the external angle of the ilium, resting them upon the crural arch. He soon reaches the closed superior inguinal ring, feeling only the peritoneal membrane, where it is readily torn. The opening here generally must be large enough to permit the passage of the entire hand. Usually the testicle, epididymus, vas defferens, or the blood vessels are found floating near the torn opening in the peritoneum. If it cannot be felt near the opening, the hand must be carried above the neck of the bladder, towards the end of the deferent canal, which must be followed until the epididymus or the testicle is found. When found it must be carefully brought outwards by a slow and steady traction upon the testicle itself. The testicle should be removed by the use of the ecraseur, or by ligature. The wound, externally, should be closed by at least a half dozen interrupted sutures in order to guard against hernia. I have had a case of hernia resulting from the abdominal operation, caused by the horse rolling after the operation and getting his feet fast under the manger, breaking the sutures. This seldom happens, but a sufficient number of sutures should be used in order to avoid the possibility of the bowels escaping and being

trampled when hernia does take place. In concluding this subject, I must say that the method of castration with the ecraseur has every advantage, with none of the disadvantages, of the other methods of operating, and before many years it will be practiced almost to the exclusion of other ways.

The masculator is the latest instrument for castration. It was introduced several years ago, and is on the order of a pair of scissors. It acts on the same principal as the ecraseur, but is a quicker method. In any method of castration, the operator should thoroughly wash the sheath before the horse is allowed to get up.

ATTENTION OF THE CASTRATED HORSE.

The wound simply requires to be kept clean. The closing of the edges of the wound is to be carefully prevented by the introduction of the finger between them. If they close too soon, a swelling will take place about the third or fourth day, and the animal will walk stiff. All old horses should be worked in about twenty-four hours after the operation and kept at light, easy work. If this be done, the danger of losing an old horse is no greater than with a colt.

RESULTS OF CASTRATION.

A restless disposition is shown on the part of old horses, who may paw and show signs of restlessness. These symptoms subside by simply exercising the horse.

Tearing the Clamps.—This results from the tail getting fast in the clamps, or the colt running through brush and tearing them off. The result of this is the appearance of a hemorrhage from the spermatic artery, which can only be controlled by a reapplication of the clamps, or by other means which will be considered later.

HEMORRHAGE.

Hemorrhage may take place, as stated before, by tearing off the clamps or from other causes.

Treatment.—When caused by tearing off the clamps or at the time of their removal, it may be checked by the reapplication of the clamp. But if the cord be retracted into the inguinal canal and cannot be reached, the checking of the flow must be tried by the application of cold water. The hose should be turned on the parts, or an iced sponge should be used. In other cases it may be necessary to pack the cavity with balls of oakum dipped in a solution of the perchloride of iron, the whole being kept in place by a suspensory bandage. If this fail, the animal must be cast and the artery ligatured.

SWELLING OF SCROTAL REGION.

The treatment of this condition we have referred to before. It must be remembered that some swelling is only normal. But when the swelling is severe the parts are to be bathed with warm water and scarified.

GANGRENE.

This is a result that may follow any operation. It may be looked for from the fourth to the eighth day. The wound will be cold, insensible, with a crepitating feeling, and will give off an offensive odor; in the place of healthy pus there will be a sanious, bloody, and offensive discharge. The animal becomes thirsty, with loss of appetite, fetid mouth, mucous membrane of a livid hue, weakened pulse, and increased respiration and temperature.

Treatment.—Remove all the mortified parts at once, to prevent absorption of gangrenous matter. A blister should be used over the swelling. The parts must be subjected to the actual cautery at white heat. Disinfecting agents should be used such as the zinc, lead and acid lotion. Iodoform should be dusted into the wound. Solution of bichloride of mercury should be used in proportions of one drachm of mercury to a pint of water. The permanganate of potash may be used in a five per cent solution. Stimulants as ammonia should be used internally in ounce doses every four hours.

ABSCESS.

These form from too rapid closure of the wound. They may be prevented by carefully introducing the finger in the wound. If they have formed, a free incision should be made into the cavity and the abscess attended to.

CHAMPIGNON.

This consists of an indurated condition of the end of the cord, of a tumefied character, varying in size and extent and slow in growth. It may extend as far up as the upper inguinal opening, or beyond it. It is in some cases as large as a man's fist, and sometimes occurs on both sides.

It often follows the operation by clamps. I have never seen it follow the operation by ecraseur. When called to operate on a champignon, I have always found, on gaining a history of the case, that the animal was castrated by the clamp method. I think it is due to the weight of the clamps pulling on the cord, or from pulling while removing them. In more than three thousand horses that I have castrated with the ecraseur I have never known of a case of champignon following; nor have I ever been called upon to remove a champignon where I could trace it to the use of the ecraseur.

Symptoms.—It develops itself at the cut extremity of the cord as a granulating mass, or a red color varying in size, its growth allowing the cicatrization of the skin to progress in such a manner that it forms a point of attachment from which the tumor seems to proceed. There may be swelling of the parts, and the animal travels stiff in the hind legs. Fistulous tracks may be seen on the surface of the scrotum. If the parts be examined the tumor can be easily felt. The tumor may extend as high up as the sublumbar region; in such cases the exact nature of the growth can only be ascertained by an examination per rectum.

Treatment.—The best method of removing the tumor is by the use of the ecraseur. An incision is to be made parallel with

the median line, when the tumor and the cord are carefully dissected and separated from their attachment. When it extends far up, the attachments may be displaced with the fingers. The chain is to be placed on the cord above the base of the tumor, and amputation is completed by slow pressure upon the cord. The operation being finished, the parts are left in the condition of a simple wound. A ligature may be used, and so long as the upper portion of the cord, which retains its healthy structure, can be reached, the application of the ligature is not attended with much difficulty.

HERNIA FOLLOWING CASTRATION.

This subject has been dealt with in the preceding pages of this work.

PERITONITIS.

This is the most frequent and most serious complication. It generally results from exposure to cold, but it may be seen where all care has been taken. It manifests itself between the second and third day after an operation.

Symptoms.—The animal is dull and refuses all food; the suppuration of the wound ceases; the bags and surrounding parts become the seat of a warm, hard, and painful swelling. The animal stands with his four legs brought close together, the back is stiff and arched, the flanks are corded, the abdomen painful, the pulse hard, small, and increased. There are slight, colicky pains; the symptoms increase and the animal dies about the sixth day. For treatment, see Peritonitis.

TETANUS.

Tetanus may follow the operation of castration, and generally proves fatal. It may occur irrespective of the method employed, or condition of the animal at the time of operating; hence the surgeon performing the operation should not be blamed. The disease usually appears about the ninth day, or when the wound begins to heal. For symptoms and treatment, see Tetanus.

AMAUROSIS.

This is a sequel of castration, having been known to follow cases where hemorrhage from the small testicular artery had occurred. The condition is incurable.

The reader should not come to the conclusion, after reading the various results of the operation, that it is a serious one. It is a very trivial one. Out of thirty-three hundred operations with the testicles in the scrotum, castrated at all seasons of the year and all ages, I have not had any of the conditions enumerated, except swelling from the wound closing too soon.

CASTRATION OF FEMALES.

Time of Operation.—The best time to perform the operation upon cows is from the sixth to the eighth year, or after they have had their second or third calf. The cow should not be in heat or pregnant, and the time selected should be from forty to sixty days after calving.

Two methods have been practiced. The original method was that of removal through the flanks, which, however, has fallen into disuse. The Charlier method of removal through the vagina is the process altogether to be preferred. It is very simple, and consists of inserting the hand into the vagina until the neck of the uterus is reached. Press against the neck of the uterus with the hand in order to stretch the walls of the vagina. Be sure that it is well stretched; then with a bistoury pierce the vaginal walls about two inches above the neck of the uterus. The incision should be three and a half inches in length, and made from below upwards and backwards. Now pass the fingers through the opening and feel for the ovaries, which will be found floating at the extremity of their ligaments, toward the entrance of the pelvis, below on each side and a short distance from the incision. Grasp the ovary and draw it carefully into the vagina and remove it with the ecraseur.

No further treatment is required beyond careful dieting. The

operation is a very simple one, and can be done while the animal is standing in a narrow stall. There are no complications following the operation.

CASTRATION OF SWINE.

In males, the best and most convenient method where the animal is large is by use of the ecraseur. Small animals may be castrated by the method of simple excision, with which all are familiar.

In females, the animal must be prepared by securing upon the right side in order to expose the left flank; the incision is made after the bristles have been clipped off in a vertical position. The left leg should be carried backwards, the head inclined on a plank. The incision, from two to three inches in length, should be made with a single stroke of the knife, without dividing the peritoneum, which should afterwards be torn with the fingers, or lifted with the forceps and cut. To find the ovaries the operator introduces the index finger of the right hand between the vertebral column and the intestines and explores the lumbar region. When the ovarian sac is found, he presses it against the abdominal wall, and causes it to slide by pushing towards the opening, where it is caught. In the same way the right ovary is brought out and both scraped from their attachment and the sac returned to the abdomen.

In old animals both ovaries must not be exposed outside together, but each must be returned when removal of the ovary connected with it has been effected.

When operating, if the animal is found to be in a state of pregnancy, the proceeding must be discontinued, the patient kept quiet, and the operation postponed.

DOGS.

The male is operated on by simple excision, tortion, ligature, or ecraseur. The females are castrated on the side and under the abdomen. The operation on the side requires about the same

manipulation as for sows, with the exception that the incision is made lower down, more forward, and nearer to the last rib. The objection to this method is that it is generally necessary to operate on both sides. I operate along the median line under the belly, and afterwards close the wound with a sufficient number of interrupted sutures. I think this method superior in all cases, and the wound does not look so badly.

The best method of casting the horse for removing the testicles is by the simple side lines. An inch rope fifty feet in length is doubled, and the doubled end is tied in a firm knot, making a loop of about two feet in length. The horse is led out on a bed of straw or grass, and a twitch applied on the nose. Put a surcingle around the body. The loop of the big rope is now placed over the animal's head on the neck like a collar, with the knot undermost. Now tie a small rope or strap around the surcingle and rope around the neck, connecting the two for the purpose of preventing the rope slipping over the head. This should be tied on both sides. Let an assistant take one end of the rope and the operator the other, and pass the ends through between the forelegs. The rope should be passed around the outside of the hind leg below the hock, passed around between the hind limbs, and brought out under itself and carried up under the neck loop and passed through it. Two or three men should then lay hold of the rope on the left side of the horse, if the operator be right-handed. The operator and an assistant should take hold of the rope on the right side of the horse and stand near the quarter of the animal. The operator should give the command to pull. The animal's hind legs are thus drawn under him, and he falls on his quarters; the ropes at the same time slipping down into the hollows of the heels. If the man at the head be handy, he will now complete the act by pulling the head to the ground and holding it there. The operator should now pull the foot tight up on the neck. The rope is then passed around the fetlock, and a hitch drawn over the fetlock and pulled tight. This

is all the tieing needed in the castration of young horses. The under rope should be left loose, and where the testicle is hard to get at, the foot in the slack rope should be pushed back in order that the manipulations may be easier.

In strong horses and origlings all four feet should be tied.

XXV.

DISEASES OF THE FEMALE ORGANS OF GENERATION.

METRITIS.

Metritis, or inflammation of the womb, occurs in all mammalia. In the mare it is usually a result of improper obstetrical instruments during the act of parturition. It may be caused by exposure to cold or damp weather soon after foaling. If the whole of the womb surface is affected, death will probably be the termination.

Symptoms.—First, an uneasiness, which increases. Soon the animal will lie down and roll. There will be arching of the back, an increased temperature and pulse beats. The appetite is lost, bowels constipated, and urine is passed frequently. Occasionally a reddish or brownish fluid escapes from the vagina. The countenance becomes anxious, and sweat breaks out on the body. Examination per rectum or through the vagina reveals increased heat of the womb. Inflammation of the womb in the virgin animal rarely or never occurs.

Treatment.—If the pulse is strong and bounding, twenty drops of the tincture of aconite should be used. Opium pulverized in drachm doses should be given to allay pain. Belladonna in drachm doses or the hypodermic injection of morphia may be used for the same purpose. Enemas of tepid water should be freely used. The cavity of the uterus should also be injected with tepid water containing a little tincture of opium. Warm fomentations to the abdomen over the region of the womb are beneficial. If the discharge continues, the womb should be injected three times a day with one part of carbolic acid to forty parts of water; or a weak solution of sulphate of zinc may be injected—four drachms of zinc to a pint of water.

LEUCORRHEA.

This is a disease of the mucous membrane of the uterus, and is characterized by an outpouring of a viscid and milky discharge. It is caused from some inflammation of the mucous membrane of the parts. It is common in old and debilitated animals.

Symptoms.—A white, glairy discharge from the vulva, running down the legs. It is generally noticed when the animal starts off after standing for some time. It is seen in cattle, associated with tuberculosis. Ovarian disease also gives rise to leucorrhea.

Treatment.—Give good food and administer tonics. Copaiba balsam and belladonna in drachm doses should be used to arrest the discharge. Give twice a day. The womb should be injected with a solution of carbolic acid, one to sixteen, at first, and afterwards milder solution may be used.

VAGINITIS.

Inflammation of the vagina may be due to contagious influences, difficult parturition, and injuries produced during coition on account of the penis of the stallion being large.

Symptoms.—The mucous membrane will be found to be hot and painful, and soon a discharge is seen.

Treatment.—Give six drachms of aloes, or a quart of linseed oil, and follow with æther nitricei, ounce one; potassium nitrate, drachms three. Twenty-drop doses of tincture of aconite may be used. A decoction of poppy heads with a small amount of zinc sulphate is beneficial as an injection. If the discharge continues, iodine and iron in drachm doses of each should be given three or four times a day internally.

TUMORS.

Tumors of various kinds are occasionally met with in the uterus. They occur in old horses; in the majority of cases it is

not worth while to remove them. If the animal be a valuable one, they may be removed by the surgeon.

HYDROPS UTERI.

Dropsy of the uterus consists of an accumulation of fluid within the cavity of the womb. I have seen the œstrual fluid retained by the hymen in young virgins. The animal looks as though she was pregnant, but she finally reduces, and on examining no fetus will be found in the uterus.

TREATMENT.—Draw off the fluid with the catheter. If a catheter is not at hand, a veterinary surgeon should be called in. After withdrawal of the fluid, the uterine cavity should be injected with a solution of carbolic acid—one part of acid to twenty of water. Powd. gentian, three drachms; powd. sulphate of iron, three drachms; powd. nux vomica, one drachm, should be given in the feed.

ABSCESS.

Abscesses occur in connection with the vulva, being the result of injuries. Treat as an abscess in any other part.

VULVA CLOSURE OF THE LIPS.

This is of rare occurrence, but may follow parturition, injury or debility.

TREATMENT.—Separate the lips of the vulva with the fingers. If this is not effectual, the knife should be used, and a pledget of tow saturated with the carbolic acid lotion should be inserted between the lips. It should be replaced after a few days.

PROTRUSION OF THE VAGINA.

This frequently occurs as a result of parturition, where the fetus has been dragged by force, constipation, injury, and debility.

TREATMENT.—If dirty, wash with warm water containing tincture of opium. The parts should be gently forced back to place

and the hind quarters of the animal be elevated. It is sometimes necessary to place sutures in the lips of the vulva to keep the vagina in position. Astringent injections will be found useful. Strong doses of opium will relieve the straining. Two-ounce doses should be given. Enemas to clear out the rectum should be given. Give light diet and improve the condition by using tonics.

CLITORIS.

This becomes diseased in various ways, and but little can be done for it. In some cases it may be necessary to remove it, but this should never be done except in cases of extreme necessity.

OVARIAN DISEASES.

We have enlargement of the ovaries and tumors of a fibrous or encysted character in connection with them. It occurs in older cows and mares that have been bred several times.

Symptoms.—The mare either refuses the horse or allows herself to be covered a number of times, but fails to conceive. Oestrum may be regular, but may extend over a longer period than it should. There will be irritation of the urino-genital system and a slight discharge of mucus from the vulva. The animal tires easily. Enlargement of the ovaries may be detected by examination per rectum. The condition can only be remedied by a surgical operation, removing the diseased ovary.

DROPSY OF THE OVARIES

Sometimes is seen, not accompanied by any well-marked symptoms, except the general symptoms of ovarian disease.

Treatment.—The fluid should be removed by puncturing the ovary and drawing off. Drachm doses of iodide of potash should be given after the fluid has been withdrawn, and should be continued for six or eight days.

OESTROMANIA.

A perpetual bulling in the cow is due to some abnormal condition of the ovaries. They never conceive, and are always ready for the male.

TREATMENT.—Two ounces of the tincture of opium may allay the symptoms. Iodide of potassium and iron may be tried, one drachm of each twice a day; but it is best to remove the ovaries.

NYMPHOMANIA.

This condition is similar to œstromania, and is remedied in the same way.

XXVI.

FEEDING THE SICK.

I propose to give here a brief practical summary of the methods of feeding sick animals. The proper feeding in acute diseases, accompanied with high fever, varies to some extent according to the individual affection, but is subject to general principles which are sufficient practical guides for most cases. When an acute febrile stage is very severe and temporary, it is usually associated with complete anorexia, which the nurse may obey with safety. After, however, the first day or two of such an attack, and when the febrile reaction is prolonged, a loss of appetite, amounting even to disgust with food, is no excuse for abstinence. The amount of nourishment received by the body is measured, not by the amount of food put into the stomach, but by the amount which is assimilated; and in febrile complaints an effort must be directed not to the filling of the stomach, but to obtaining as large an assimilation of food as possible, without disturbing the alimentary canal. Any symptoms of gastric or intestinal disturbance should be the signal for immediate lessening of the food. Excessive tympany, or an increased diarrhœa from over-feeding, should not be overlooked, nor attempt made to remove the symptoms by medicine. Such practice is exceedingly reprehensible. In febrile diseases the feeding should be at short intervals, with small amounts of liquid foods of a nutritious, easily digested character. The feeding of sick animals has not received deserved attention, and as a result many an animal has been lost that otherwise could have been saved.

It may be set down as a general rule that all foods given in protracted febrile states should be in liquid form. In all febrile cases alcohol in some form should be given with the food. Alcoholic liquors in moderate amounts stimulate the stomach and aid digestion and absorption, but in large amounts interfere with these processes.

MILK FOOD.

Of all liquid foods, milk is the best and the most generally applicable to the treatment of disease. Cows' milk contains, in round numbers, 87.5 parts of water, 3 parts of caseine, 0.75 parts of albumen, 3.6 parts of fat, 5 parts sugar, and 0.07 of inorganic salts. One pint of milk contains in round numbers 0.6 ounces of solid albuminous substance, 0.6 ounces of fat, and 0.8 ounces of sugar. When four quarts of milk are taken in the course of twenty-four hours, about five ounces of fat are digested. It may be necessary to skim the milk when the amount of fat is too great for the alimentary canal to digest. Milk leaves behind no fecal matter, and its use, therefore, frequently produces constipation. In case of diarrhœa, if the milk be boiled fifteen minutes, it will arrest the ailment. There are very useful, nutrient, and stimulating foods prepared with alcohol in milk as follows:

Wine Whey.—Bring half a pint of milk to the boiling point; add half a pint of sherry wine, and allow it to stand in a warm place for five minutes; strain and sweeten to taste. It contains very little nutriment, but is sometimes tolerated by the stomach, which refuses other food.

Milk Punch.—Take half a pint of milk; pour into it from a dessertspoonful to a tablespoonful of brandy, rum, or whiskey, according to the need of the patient. This preparation represents all the nutritive value of milk and the stimulating effects of liquor. A tablespoonful of lime water should always be added to it before putting in the brandy.

Eggnog.—Eggnog is a rich, highly nutritive liquid, but should be used in very small quantities. The yelk of one egg may be added to half a pint of milk, afterwards half an ounce to an ounce of brandy and the white then beaten in.

Carbonic acid water added to milk is a very good food.

Liquid meat foods are valuable in our patients, especially for delicate dogs. Liquid meat foods are either raw or cooked. Of the raw foods meat juice is the best. This is made by selecting lean from the round of beef, cutting it into small pieces, and

pressing the juice in a press of sufficient power, such as now can be purchased at any of the large drugstores. Liebig's beef tea is made by adding seven ounces of water and three or four drops of hydrochloric acid to one and a half pounds of lean beef, allowing it to stand one hour, passing through a hair sieve, and washing out the meat with three ounces of water. This is very weak, and must be given in large quantities.

Meat juice is valuable where a powerful stimulant is desired and the digestive forces weak, as in the feebleness and collapse that follows distemper in dogs.

In making beef tea a round of good beef should be selected and cut in small cubes not larger than a half inch in diameter. It should then be put to soak for two hours on the back of the range in an earthenware pipkin, with one pint of cold water, and allow to simmer for about fifteen minutes, and finally to boil for three minutes. After adding half a teaspoonful of salt and a little pepper the tea is ready for use.

In making beef essence the meat should be prepared as for beef tea. It should be put into an earthenware bottle and loosely corked. This should be set in a pot of cold water and brought very gradually to the boiling point. It then should be allowed to boil for from twenty minutes to half an hour.

Soups are liquid preparations which resemble beef tea and beef essence in containing the extractives of meat, but which differ from these preparations in containing various nutritive substances.

To make chicken broth, take three pounds of chicken well cleaned, cover with cold water, boil from three to five hours (until the meat falls to pieces), strain, cool, and skim off the fat. To a pint of this add salt and pepper and two tablespoonsful of soft rice, which has been previously thoroughly boiled in water; bring the broth to a boil. In preparing rice, half a cupful should be boiled for thirty minutes with a teaspoonful of salt in a pint of water. To make mutton broth, take one pound of lean, juicy mutton, chopped fine, and proceed as with chicken broth.

Liquid meat foods are more valuable for dog patients than any other class. During convalescence, starchy foods may be administered. In chronic patients they are serviceable. Oatmeal porridge may be made by stirring two ounces (half a cup full) of crushed oatmeal into a pint of milk, previously warmed, and afterwards cooking twenty to thirty minutes, adding salt to the taste.

Porridge and milk is very beneficial for little dogs suffering from chronic eczema and similar diseases where dieting is necessary. It is good for colts and convalescent horses. All the various porridges are somewhat similar, and all are beneficial.

Peptonized milk is very beneficial in all patients, and is made by diluting a pint of milk with a quarter of a pound of water, heating to about 140° F., adding two teaspoonsful of liquor pancreaticus with twenty grains of bicarbonate of soda, digesting in a warm place for an hour to an hour and a half, and rising momentarily to the boiling point; at the temperature of 65° F. the digestion will usually require about three hours.

Peptonized milk gruel is made by first preparing a thick gruel with arrow-root, oatmeal, sago or other similar articles, adding, while still hot, an equal quantity of milk, and subsequently cooling to 100 degrees; for each gruel, put twenty grains of the bicarbonate of soda and two tablespoonsful of the liquor pancreaticus or five grains of pancreatic extract, digesting in a warm place for two hours, boiling the mixture momentarily, and straining.

Peptonized beef tea is prepared by simmering half a pound of minced beef for two hours in a pint of water containing twenty grains of bicarbonate of sodium, allowing it to cool to about 100° F., digesting at this temperature with a tablespoonful of liquor pancreaticus or ten grains of pancreatic extract for three hours, decanting and momentarily boiling.

RECTAL ALIMENTATION.

In paralysis of the throat or structure of the œsophagus and

similar diseases, feeding by the rectum becomes a matter of utmost importance.

The method of preparing the injection of nutriment is as follows: The pancreas of swine or cattle are carefully cleaned of fat and 50 to 100 grammes thereof cut into very small pieces. In like manner 150 to 300 grammes of beef are prepared. Both substances are then put into a dish with about 50 to 150 c. c. of luke-warm water, and stirred into a thick paste and drawn into a clyster pipe with wide opening. In many cases from 25 to 50 grammes of fat may be added to the mixture. An hour before using this clyster, one of pure water should be given to clean out the intestines.

As the horse advances in convalescence, there is nothing that he will relish so much as fresh grass. As his appetite returns, he should be given green grass in small quantities. If it be in the winter time, when grass cannot be procured, a tea made of good hay is very nourishing, to which a little salt is added. He may now take a small amount of boiled oats, an apple occasionally, or a bran mash.

A bran mash is made by pouring boiling water over good wheat bran; sufficient water must be added to wet the bran, then cover the surface with dry bran and allow to set for several hours, when it is ready for use. This is very beneficial, as it acts as a mild laxative to the bowels.

The various foods herein recommended for the sick are of the greatest importance in treating diseases of the dog. The various preparations of beef tea and milk, given at small intervals and in small doses, are of great value. They must not be used too freely, and the effects must be watched. The stomach of the dog in some cases is very delicate.

Delicate calves and all of the small ruminants should receive nourishment during sickness. If this is not done, their strength is soon exhausted; in this way many are lost that would otherwise recover.

XXVII.

GENERAL SYMPTOMS OF DISEASE.

In addition to what has been said regarding special symptoms, other and general symptoms will here be given in order to give assistance in the diagnosis of disease. The general appearance of the visible mucous membranes is of great assistance to the veterinarian in the diagnosis of disease. The natural color of the Schneiderian membrane, conjunctiva, and mucous membrane of the mouth is a pale red, or carnation. Any deviation from this is indicative of some disorder. A heightened color of the membrane is indicative of an over-excitement of the circulatory system.

The appearance of the mouth offers the greatest aid to diagnosis. If the mouth is red, it indicates an irritable and congested state of the digestive organs or forms of eczema. If yellow colored, with desquamation of its epithelium, it indicates Rinderpest. When the gums and lips become pale, it indicates the approach of death. Usually about two hours before death the membrane becomes pale; at intervals the normal redness partially returns, and finally the membrane is void of all circulation and color. Yellowness of the membrane indicates disease of the liver; a slate-colored appearance, a condition of the blood due to the poison of glanders; rusty color, some form of epizootic disease; pink, or pink-eye, epizootic cellulitis; lividity, a carbonized or non-oxygenated condition of the blood, as in bronchitis and pulmonary congestion.

A foul appearance of the tongue, so valuable an aid to diagnosis in the dog, is rarely observed in the ox and horse. However, in dyspepsia a foul condition of the membrane is seen in the horse and ox. An acid condition of the salivary secretion gives off a sour and fetid smell. Dryness of the mouth is indicative of inflammatory disease.

Symptoms Afforded by the Pulse.—The pulse is the index to the patient's feelings. No branch of medicine is so important as the study of the pulse, as it indicates the treatment to be adopted. To understand the pulse thoroughly requires long and diligent practice, in which the sense of touch must be trained and cultivated. The normal and abnormal pulse must be taken and its variations noted. It is one of the many never ending studies, but by long practice and study we are enabled to understand the feelings and condition of the patient.

The pulse is the beating of the arteries, and is usually taken at the jaw—the sub-maxillary artery, or on the inner side of the arm—the brachial artery. In the cow, whilst recumbent, the pulse may be very distinctly felt on the posterior part of the fore fetlock; in the dog, it is best felt at the femoral artery, on the inner surface of the thigh. The pulsations felt by the finger are principally due to the fact that the artery expands during the contraction of the heart, and returns to its previous condition during the relaxation of the organ. The variation of the normal pulse differs about ten beats. The standard is set at forty beats per minute. The normal pulse, therefore, would range from thirty to forty. Cow, forty to fifty; dog, eighty to one hundred, according to size. The pulse of the sheep ranges from seventy to eighty.

We speak of a pulse as being quick when the heart accomplishes its contraction almost instantaneously; slow when there is a prolonged or slow contraction of the cardiac ventricles; an infrequent pulse, when it is associated with slowness. An intermitting pulse is that in which a pulsation is occasionally omitted. The volume of the pulse may be greater than usual, in which case it is said to be large, or it may be less than usual when it is said to be small. *The feeble pulse*, if associated with softness, the artery yielding readily to the finger, indicates general or cardiac debility. The small pulse may result in anæma, from congestion of some important organs, as the lungs, or from feeble contraction of the heart. The hard pulse—hardness of the pulse—is the

condition in which the artery resists compression; it results from contraction of the muscular coat of the arterial walls. Hardness of the pulse is often associated with smallness. It is then termed corded, wiry, or thready. This pulse is seen in the early stages of inflammatory diseases.

SYMPTOMS CONNECTED WITH THE RESPIRATORY FUNCTIONS.

The respiratory movements may be quickened, difficult, labored, wheezing, roaring, stertorous, spasmodic, convulsive, irregular, slow, thoracic, or abdominal.

Quickened breathing may be produced by any cause which accelerates the circulation of the blood, as exercise.

Difficulty of respiration is a prominent symptom of disease, and is associated with all respiratory diseases, as inflammation of the lungs, pleura, larynx, and trachea.

Stertorous Breathing—Snoring.—This breathing is a symptom of brain disease. When the inspirations are delayed and then performed with a sudden noise and jerking effort, with diminished susceptibility to outward impressions, it is a symptom of the approach of death.

Abdominal breathing is performed by the animal holding the ribs in a fixed position, owing to pain in the chest. It is a symptom of pleurisy and other chest troubles.

Thoracic breathing is where the abdominal muscles are prevented from taking part in the respiratory movements, an account of abdominal pain or obstruction.

Irregular breathing is where there is a want of harmony in the expiratory and inspiratory movements, as in broken wind.

COUGH.

This renders some aid in diagnosis. Coughs are known as dry, moist, short, hacking, violent, spasmodic, those peculiar to broken wind, and roarers.

The moist cough attends catarrh, bronchitis, and diseases

where the secretions of the mucous follicles of the air passages are increased.

The dry cough is usually present during the early stages of catarrhal affections, as in pleurisy, etc.

THE THERMOMETER is a great aid to diagnosis. The animal body is so constituted that neither heat nor cold will have any material influence on the temperature until vitality has ceased.

The temperature of the body in the internal parts of the horse is from 99 to 102° F. In young animals the temperature is generally 102, while in very old animals it is as low as 97 or 98°. The surrounding atmosphere may cause some variation in temperature. The method of taking the temperature of the body in the lower animals is by introducing a properly registered thermometer into the rectum.

Many practitioners use their hand in the animal's mouth and on the rectum to ascertain the amount of abnormal heat present. But there are cases where only the properly registered thermometer can be admitted. The method of measuring the heat by the thermometer holds a highly important position, not only in cases of illness where symptoms are present, but more particularly in the incubative stages of contagious or infectious diseases. The straight thermometer is the best instrument to use. It should be kept in the rectum three minutes, and may be tried twice.

XXVIII.

CONTAGIOUS DISEASES OF THE HORSE.

A contagious disease may be defined as one induced by the operation of a specific virus termed a poison, which is conveyed by contact into the system of a healthy animal, producing a condition identical with that of the body from which it originated.

An infectious disease is one which has the power of spreading itself by diffusion of the specific material through the air, and is not transmitted by actual contact with the diseased animal.

GLANDERS AND FARCY.

Glanders may be defined to be a malignant disease, contagious, and due to the introduction into the system, or of generation within it, of a specific virus, the bacillus mallei. They show their specific effect principally upon the Schneiderian membrane, but traces of the poison may be seen in the lungs and lymphatic glands. It is communicated to all animals except cattle and pigs. When it occurs in man it seems to increase in intensity and malignancy. Some veterinarians claim that it originates by contagion only, while others claim it is capable of spontaneous origin. I am inclined to believe that it originates spontaneously. Glanders may occur in four forms—namely: Acute glanders, chronic glanders, acute farcy, and chronic farcy. It arises from debilitating influences, such as exhausting diseases, overwork, bad food, and bad ventilation.

Glanders and farcy are one and the same disease. The virus is identical in both forms of the disease. The discharge from the nose of a glandered horse when introduced into the system of other horses may in one produce glanders and in another farcy; while the pus from a farcy ulcer may produce in the inoculated animal glanders, farcy, or both.

CONTAGION.—Glanders does not seem to be a highly contagious disease; cases are known where affected animals worked and stood by the side of healthy animals for months without transmitting the disease. Again, when once introduced into the stables, it is certain to spread among the horses there located. The vitality of the virus is wonderful, as it may be dried in air, remain in that condition for years, and on being rendered fluid is found to retain its virulence. The virus may be taken into the nasal chambers in the form of dust, and on becoming moistened by the secretions inoculate itself.

Fig. 81—Chronic Glanders.

PERIOD OF INCUBATION.—The period of incubation is short. It generally shows itself in connection with the submaxillary glands on the third day after inoculation, and the discharge from the nostrils occurs from the third to the sixth day. In some cases it does not appear for a much longer period.

SYMPTOMS OF ACUTE GLANDERS.—The disease is ushered in by rigors, usually followed by a discharge and ulceration of the mucous membrane of the nose. The temperature is as high as 106°, or sometimes as high as 109°. The breathing is affected, the appetite fails, and the eyes are affected. The principal diagnostic symptoms, however, are connected with the nasal chambers. There will be an abundant discharge from the nostrils of a fetid nature. The pituitary membrane at first is of a dark copper color, with patches of ecchymosis of a dark red hue. It gradually becomes paler, and the patches are rapidly converted into pit-like, ragged-edged ulcers, from which issues the discharge. The submaxillary lymphatic glands enlarge. Other

lymphatic glands enlarge, burst, and discharge a purulent material. This form of glanders is rapidly fatal.

Symptoms of the Chronic Form.—This form of glanders is the most common, and is frequently seen in old, debilitated animals. The animal may be affected for some time without presenting any well-marked symptoms. The general health is scarcely affected. The submaxillary gland becomes intermittently swollen and hard. The nostrils finally become paler, and soon the starchy, glue-like discharge comes on. The discharge usually issues from one nostril, although it may issue from both. If the discharge is thrown into water it sinks readily. In chronic glanders, the ulcers in many instances are not present. There will usually be a slight irritation of the eye on the same side as the nostril that is discharging. In order to bring out the symptoms, ten drachms of aloes may be administered, when usually the symptoms become more marked. If a case is suspected, it should be isolated. Some of the nasal discharge may be inoculated in the hind limb; if glanders is present farcy will probably appear.

Fig. 82—Acute Farcy.

Acute Farcy.—The signs are those of fever, the temperature ranging from 106° to 108°. The first symptom to attract attention is a swelling of the limbs. There is an engorgement of the whole limb, resembling the swelling of lymphangitis. The lymphatic glands will be enlarged, showing cords and buds. These buds

burst and become confluent. The buds are generally seen in groups and away from the articulation.

Chronic Farcy.—The fever is not well marked; locally there will be ulcers on the outer and inner surface of the thigh. The buds range themselves in groups, and run in the same direction as the veins. It may affect the submaxillary glands and neck. Some eminent authors hold that particular forms of farcy and glanders can be cured. I do not believe that a pure case of glanders or farcy has ever been cured. Where cures are reported, there was mistake in the diagnosis. Isolating the animal for treatment is all very good, and perhaps the symptoms can be removed for the time being, but the danger to human life requires immediate destruction. There is no doubt that the animal may transmit the disease when all external symptoms are removed. If the bacillus has ever been in the system, it remains there in spite of all treatment. We know of no medicine that will cure the disease. One working with a glandered horse should be careful that there are no abrasions on the hand, or that the discharge does not in any way come in contact with the mucous membrane of the eye or nose.

Preventive treatment after the disease appears in a stable is of the greatest importance. The ventilation, food, and water should be looked after. The stables should be whitewashed. The wash should contain a pint of crude carbolic acid and a half ounce of bichloride of mercury to each bucketful. The stall in which the affected animal occupied should be torn out and his harness burnt with it in a heap. The fittings should all be painted. All horses in the stable should be given at each meal two ounces of the hyposulphate of soda, or two drachms of the chlorate of potash.

STOMATITIS PUSTULOSO.

This is a contagious disease, seldom seen in this country. It is said to have occurred in Germany. It affected horses principally from four to five years old. The animals looked to be in a healthy and thriving condition, but on eating hay large quantities of

saliva would flow from the mouth. The temperature of the skin is warm, the pulse 60, the respiration normal. They all eat heartily, but masticate and swallow with difficulty. There is abundance of saliva, a green discharge from the nostrils, water taken returns through the nose, and the Schneiderian membrane is of a rose color. The submaxillary glands enlarge, the mucous membrane becomes hot, and firm nodules make their appearance.

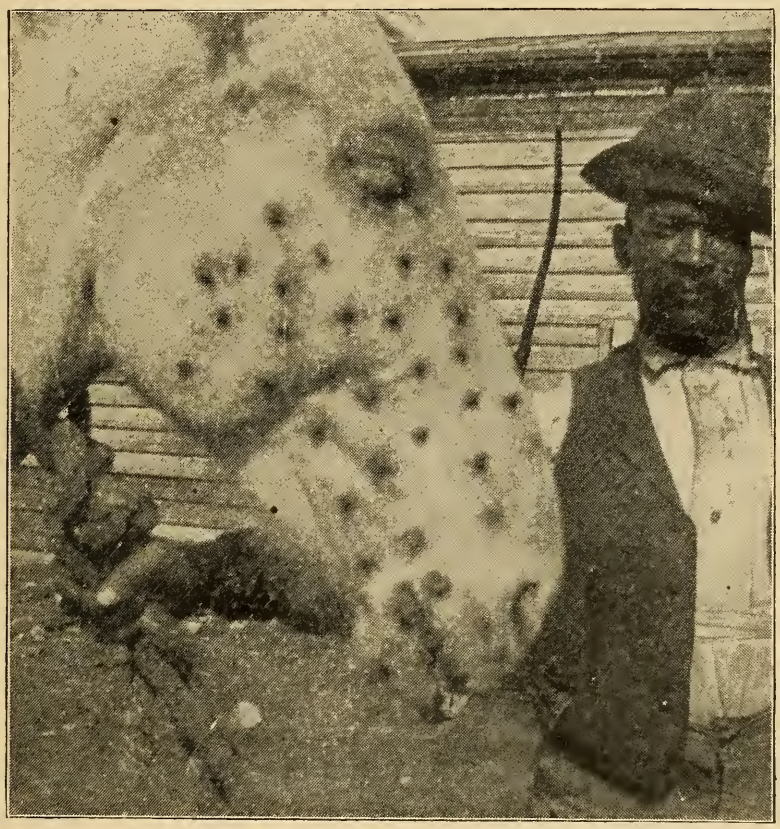


Fig. 83—Stomatitis Pustuloso.

These extend to the cheeks, tip of the tongue, inferior surface of the tongue and lips. They soon form ulcers and ultimately begin to heal. The disease runs a rapid course. The ulcers begin healing about the sixth, and the animal gets clear of the disease, under treatment, in twelve or fourteen days. The disease is transmissible to man and some of the lower animals.

The disease greatly resembles glanders, but the close observer will see a vast difference from it.

ANTHRAX.

Anthrax seldom attacks the horses of this country. It is said to prevail in India to a great extent. Elephants and other animals suffer with this trouble, and it is termed in that country Loodianna disease.

Symptoms.—Dullness, a heavy, feeble step, falling prostrate. If the animal be standing, the head hangs down, resting on the manger. It sometimes stands back in the stall, and finally becomes restive, stamps the foot, looks at the side, and shows other signs of colic. The disease comes on while at work; there will be great weakness manifested, a stiffness over the loins, and a staggering gait. The skin is hot, the muscles tremble, and there is a flow of saliva from the mouth.

Great excitement sets in, and soon he becomes unconscious to all around. The conjunctiva is of a yellowish red color, the pulse small and thready, and the respiration irregular. The symptoms soon increase, the muscular force becomes exhausted, the animal falls to the ground, and finally dies. The disease may terminate in from six to forty-eight hours after manifestation of the first symptoms.

The Symptoms When Tumors are Present.—Usually, when the fever begins, tumors form on the surface of the body. This is generally the first symptom noticed. They are developed principally in the subcutaneous areolar tissue. The development of these tumors is shown by heat in the skin, standing out of the hairs, and crepitation. They may be felt, as large as a walnut, adhering to a pedicle at its base. They are painful, and the sensibility of the surrounding tissue is increased. When lanced, the animal shows no pain, and a brownish or black fluid escapes, together with a fetid gas. These tumors may be found in any part of the body and in great numbers.

GLOSS ANTHRAX.

This is shown by tumors on the mucous membranes, and especially are they seen in connection with the tongue or inside of the

lips. They vary in size from that of a nut to a hen's egg, and are filled with serum. The tumors are of a yellowish-gray color resting on the surface of the mucous membrane. The tongue swells and hangs out of the mouth, taking a bluish, mulberry color. The swelling extends to the throat, and the animal dies from suffocation.

TREATMENT.—Preventive is of the greatest importance. A seton inserted in the breast is recommended as the best preventive measure, with the addition of four drachm doses of chlorate of potash dissolved in the drinking water, or given in a drench dissolved in a pint of water. The pasture should be changed. If it occurs on a rich pasture change to a poorer one. The disease usually occurs on rich pastures, and on dry soils in damp seasons. If the disease is not fully developed, treatment may be tried. The tumors may be dressed with one part of carbolic acid to four parts of sweet oil. Three drachms of chlorate of potash to one pint of water should be given. Twenty drops of carbolic acid; glycerine, one-half ounce; water, one pint, should be tried.

VARIOLA EQUINA, OR HORSE POX.

This is an eruptive disease, similar to cow-pox affecting cows. The eruptions are preceded by a very slight fever. The eruptions appear on the skin over the whole body. Variola is transmissible from horse to horse, to the cow, and mankind. It is a very mild, benignant disease, and is not beneficially influenced by the action of medicine.

STRANGLES

Is a contagious disease peculiar to the horse. The disease may be induced by inoculation. It generally prevails in the springtime. It is accompanied by well-marked febrile symptoms, attacking young horses, and terminating in the formation of an abscess in the areolar tissue of the submaxillary space. It may affect horses of any age, but is not transmissible to man or other animals. There are two forms of strangles, the regular and irregular. The

irregular form is a very grave affection, malignant in its nature. In this form tumors may form in the mesentery or in any part of the body. I have seen pus pouring from more than two dozen abscesses at a single time in various parts of the body. The disease rarely attacks the same animal more than once.

Symptoms.—The first symptom of the disease is dullness; the animal is easily fatigued, and perspires on very slight exertion. The first decided symptom is difficult deglutition. The animal pokes his nose out, holding it in a stiff position. A well-marked fever is present, and soon a tumor makes its appearance in the inferior maxillary space, at first hard, but it enlarges and finally becomes soft, containing pus. When the acute febrile symptoms have subsided, a discharge from the nose takes place. The disease runs a course of eight or ten days. In eighteen or twenty days the animal is usually fit to put to work. The disease is seen in the spring months.

Fig. 84—Regular Strangles.

Treatment.—The treatment of strangles is very simple. Place the patient in a loose box, and give abundant pure air. The body should be well clothed. The diet should consist of easily digested food. Alcohol, one ounce, or nitrous æther, one ounce, should be given three times a day. Nitrate of potash in three-drachm doses should be given three times a day, dissolved in the drinking water or given in a drench. If the pulse is weak, a half ounce of alcohol may be given three times a day. The animal should be walked in the warm sun. The camphorated liniment should be applied to the swelling under the jaw, or turpentine, ammonia, and linseed oil, equal parts, may be used, and ultimately a fly blister. When the abscess begins to fluctuate, it should be lanced. If there are symptoms of suffocation the surgeon should be called in and a tracheotomy tube inserted.

Irregular strangles should be treated in the same way locally; but constitutionally, an effort must be made to support the system by good food and tonics. The animal must be protected from the weather, and should receive the best attention. The horse should be made to inhale steam, with a little turpentine added to the water. The local lesions are much more severe than in the

Fig. 85—Irregular Strangles.

first form. Tumors may arise over the face, neck, body, and between the thighs. The flesh is lost rapidly, the hair falls out of the mane and tail, the discharge from the nose increases, the legs begin to swell, and the patient becomes affected with glanders and farcy. The horse should be removed to a healthy situation. He should be kept in a box by himself, and have a liberal allowance of hay or grass and bran mashes. Milk should be given, or milk, eggs, and whiskey. See chapter on Feeding Sick Animals.

XXIX.

EPIZOOTIC AND ENZOOTIC DISEASES OF THE HORSE.

An epizootic disease is one that spreads rapidly, attacking large numbers of animals in a short space of time, and destroying many. An enzootic disease is one peculiar to certain districts, and results from local conditions. An epizootic disease originates independently of contagion or infection. An epizootic disease is sometimes conveyed, however, from one locality to another by animals which are or have lately been suffering from it.

INFLUENZA.

Influenza is an epizootic, febrile disease, attended with early and great prostration of strength and inflammation of the nasal, laryngeal, and tracheal mucous membrane. It is known by a number of names, as la grippe, epidemic catarrh, catarrhal fever, etc.

The history of the disease extends far back into ancient days. Hippocrates, a Greek physician who lived four hundred years before Christ, and who was styled the "Father of Medicine," mentions the disease as occurring in the human at that age. Since the year 1299 the disease has had many outbreaks in this and foreign countries. To trace its early history and point out the dates of the different outbreaks is beyond the purpose of this book.

Causes.—The causes are predisposing and exciting. The predisposing causes are sudden change in the temperature and badly ventilated stables. The disease is usually seen during the spring months, and occurs more frequently in low, swampy situations. Usually the first symptom noticed is dullness; rigors are present, the coat is rough, and a cough is present. The appetite fails, the mouth becomes hot and dry, the temperature runs up, cough-

ing becomes more violent, the bowels are constipated, the urine becomes scanty, and is darker than natural. The characteristic symptom of the disease is early debility and weakness, the animal staggering during the acute stages. He quickly becomes dull and languid, his strength leaving him the first few days of the attack. Sore throat is present, and the animal seems to suffer headache. The breathing is affected. Soon a discharge of a brownish-red color takes place from the nose. Pneumonia frequently follows influenza. If an animal suffering with influenza be worked before he has entirely recovered, and be caught in rain, pneumonia is almost certain to follow. Frequently abdominal complications are noticed; the animal acts as though suffering with colic. Sometimes the liver is involved. This may be detected by a yellow tinge of the mucous membrane. There may be considerable swelling of the legs and sheath, and perhaps of the belly. Toward the termination of influenza, rheumatic complications often occur. In some cases this may be noticed in the early part of the disease. Few horses suffer from more than one attack during the same season. The disease usually does well. Aged, debilitated, or otherwise diseased horses are the ones to succumb to the disease.

Treatment.—The disease being a fever, must be allowed to run its course. The animal should have good ventilation and be protected from the heat and sun. If it be in winter, the body should be judiciously clothed and the legs bandaged. Pure cold water should be given freely, and he should have any food that he will take. The liquid foods mentioned in this work should be given, and especially those containing milk and alcohol. Medicinal remedies consist in giving spirits nitrous æther in ounce doses three times a day. Nitrate of potash in half-ounce doses should be given for the first few days, and then followed with chlorate of potash in two-drachm doses three times a day. Medicines may be given in the drinking water, if the animal will take it that way. Stimulants should be given—liqua acetate of ammonia, two ounces in a pint of water, three times a day. Alcohol, wine,

beer, whiskey are all good. If the throat is sore, ammoniacal liniment should be used. If pneumonia complications are present, treat as for pneumonia. Where abdominal complications are present, two ounces of the tincture of opium may be given. Some cases may become dangerous from the larynx becoming involved, rendering breathing very difficult. In such cases it may become necessary to call in the veterinary surgeon to insert the tracheotomy tube. If a troublesome cough remains after the disease has subsided, the ammoniacal liniment should be applied to the throat.

PLEURO-PNEUMONIA.

This is an epizootic disease, consisting of an inflammation of the pleura and substance of the lung. It is accompanied by a low typhoid fever, which lasts from seven to fourteen days. This disease has prevailed to a very great extent in England and south of Britain. It attacks principally debilitated horses, but may attack the most robust.

Cause.—Change of weather is the most usual cause, especially in the spring and summer months. It is generally believed that the disease is contagious and infectious. This may be true in some forms of the disease, while in others it most assuredly is not.

Symptoms.—The animal is dull, off its food, weak and dejected. The pulse will number from sixty to eighty beats per minute, temperature 103° to 104°. A cough is present in the acute stages, the extremities are alternately hot and cold, the mucous membranes are dejected and of a rusty tinge. The mouth is foul and the abdomen is tucked up. The animal persistently stands, with his nose poked out, his forelegs far apart; the breathing is short and labored, and he will groan if made to turn around. In some instances the whole body becomes stiff. Percussion and auscultation will cause pain, and there will be absence of sound over the diseased pleura.

Treatment.—Place the animal in a comfortable stall, if that can be procured, free from draughts of cold wind. The body

should be clothed according to the season of the year. The external treatment is of great importance, and consists of the application to the lung of four ounces of mustard to a half pint of water. An ordinary newspaper should be applied to the part while wet. Hot bran poultices should be applied to the lungs, with an occasional repetition of the mustard. Cool and fresh drinking water should be placed in the stall. The poultices may be put into ordinary wide bags, tied together and thrown across the horse's back. The poultice should be manipulated so as to cover equally the lung. It should be tied down with a long rope that will reach twice around the body, bringing it to bear on the anterior and posterior part of the bag. Where such treatment is employed, not more than one in fifty will succumb to pleurisy or pneumonia. Aconite tincture, twenty drops, three or four times a day, in conjunction with one ounce of alcohol in a pint of water, should be administered. Sweet spirits of nitre in one-ounce doses may be given every four hours, or the liqua acetate of ammonia, in two-ounce doses, may be given. Nitrate of potash should be given in three-drachm doses in the early stages of the disease, and increased to one ounce in the later stages. During convalescence three drachms of gentian with three drachms of sulphate of iron may be used in the feed night and morning. In this disease the liquid foods recommended for the sick are of the greatest importance, especially the preparations of milk.

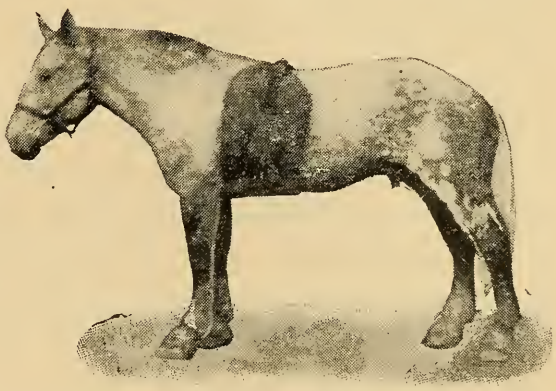


Fig. 86—The Manner of Applying a Poultice to the Lungs.

PURPURA HAEMORRHAGICA.

This is an eruptive, non-contagious fever, occurring as an idiopathic disease, but most generally resulting from certain debilitating diseases.

Symptoms.—The primary manifestations are uncertain. In some cases swelling of the hind limbs is the first symptom noticed. In other instances the approach of the disease is shown by a few purple spots in the nostrils. Soon the purple spots are seen thick, in connection with the mucous membrane. Some of them are not much larger than a pin-head, but they grow larger and often become confluent, and cause sloughing of the mucous membrane. The pulse varies in character; in some cases quickening, in others infrequent. The temperature rises to 104-106° F. When the fore limbs are affected, the nose and head swell. This sometimes reaches such dimensions that there is danger of suffocation. The swellings disappear at one place and reappear in another. In horses with white heads the purple spots may easily be seen. If the nose is much swollen, the breathing will be difficult and blood will escape from the nose as a result of sloughing of the membrane. The urine is generally high, of a dark color. The disease may occur without the external manifestations, but such cases are very rare.

Treatment.—In the treatment of this disease it is of great importance that the animal be quartered in pure, healthy atmosphere, the box dry, clean, and, if possible, in the sunlight. Purpura, being a disease in which the blood is very much altered, with loss of a portion of its product of albumen and fibria, requires the administration of potassium chlorate in ounce doses, given once or twice daily. The chlorate of potash may be reduced one-half on the second day. Turpentine every alternate day, in two-ounce doses, may be given. Spirits of nitrous æther, in ounce doses, may be given with benefit if the heart is weak.

The local treatment consists in the application of zinc and lead or the acid lotion frequently referred to. Fomentations may be

used to relieve pain. A solution of the perchloride of iron makes a good local application, in proportions of one ounce of iron to a pint of water.

SCARLATINA.

This is a febrile disease, characterized by an eruption on the skin. Spots are seen on the nose and throat. Suppuration occurs in various parts of the body, and especially in connection with the under jaw. The disease much resembles purpura. The soreness of the throat, which is always present in scarlatina, gives it a distinction from purpura. This sore throat is accompanied with a cough, which will recede with the eruptions on the fourth or fifth day.

Treatment.—Treatment is similar to purpura, with the exception that poultices and warm fomentations are to be used to the throat. A liniment composed of equal parts of ammonia, turpentine, and linseed oil may be applied to the throat in the place of poultices. During convalescence the animal should be exercised lightly and given good, nutritious food.

EPIZOOTIC CEREBRO-SPINAL MENINGITIS.

Definition.—An inflammation of the brain, spinal cord, and their coverings. It is a non-contagious epizootic disease of the Zymotic class, and has been confined principally to the United States. In the year 1871 it played great havoc in New York, Philadelphia, and Boston. It occurs annually in an epizootic form on the sea coast of Virginia, comprising the counties of Nansemond, Princess Anne, and Northampton, and the adjacent counties of North Carolina. Isolated cases occur throughout the United States. I have witnessed it in the valleys and in the mountains of Virginia, West Virginia, Tennessee, and Maryland, but never in the epizootic form. The most favorable location for the development of this disease, and the one in which it has been most destructive, is on Nansemond river, one of the most fertile sections of Virginia east of the Blue Ridge Mountains. Here

the farmers annually suffer great loss from this disease. But few farms located on the river front have escaped this disease in the past five years. It visits many every year, and I have witnessed as many as six cases affecting all the animals on one farm in two weeks' time. It occurs in the epizootic form here during the months of July, August, and September. Isolated cases are met with during the winter months. During December, 1900, and January, 1901, the disease assumed the epizootic form in the counties above mentioned, it being the first time in a number of years that it occurred here in the epizootic form in winter. The

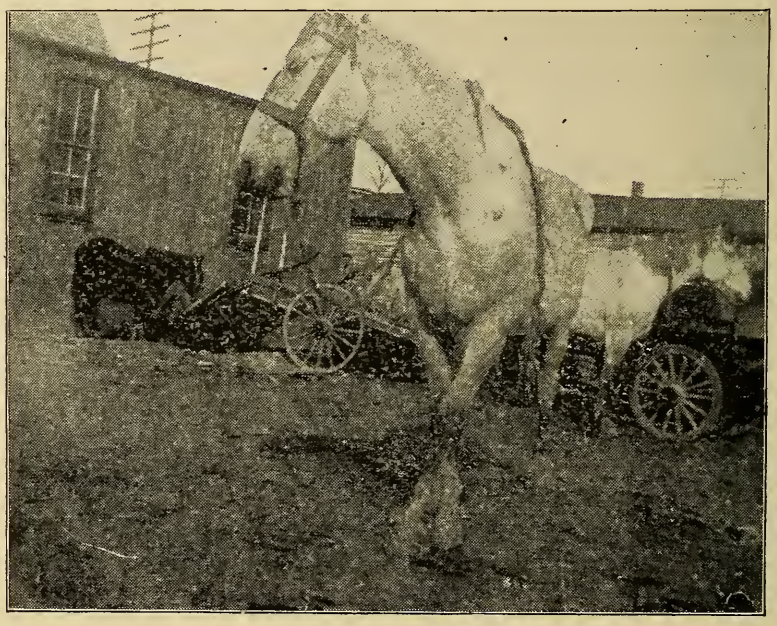


Fig. 87—Cerebro-Spinal Meningitis. Staggering and giving away in the limbs.

cities in the vicinity of the infested district are almost free from the disease, only a small number of cases having occurred each year.

Its origin is involved in mystery. It is due to a specific poison, which, existing in the air, becomes absorbed in the system. We do not know the origin and nature of the poison. The more experience we have with the disease the more are we at a loss as to

its causes. By witnessing it in all its forms and stages, in every conceivable locality, manner of feeding, and quality of drinking water, we become dumb-founded in its contemplation. To make matters worse, it chooses for its prey the better kept animals. I believe that it is conveyed into the system from the air. By chemical analysis of the various tissues of the diseased body, compared with those of the soil, vegetation and water of the surroundings, we may discover the cause and its origin.

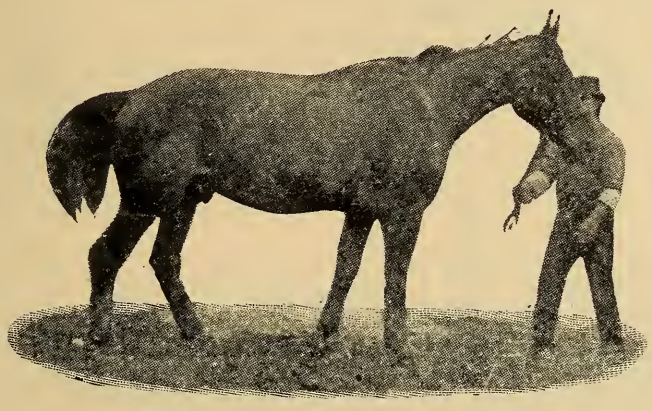


Fig. 88—Cerebro-Spinal Meningitis. Showing well marked paralysis during progression.

Symptoms.—I will first give the symptoms of that form of the disease met with during the heated months of the year. The first symptom is dullness. The animal drives duller than usual. If this symptom is noticed during the outbreak of the disease, the animal should at once be taken to the trough to drink. First remove the bridle, and get in a position to see him take the first swallow. If he sips two or three times before swallowing, then succeeds in swallowing a small quantity, and finishes his drink in the regular manner, swallowing after each draw, the poison is in his system. The disease at this stage can be treated as successfully as a bad cold. If the disease is allowed to go on, the animal grows duller, in two or three days he will stumble occasionally, may fall but

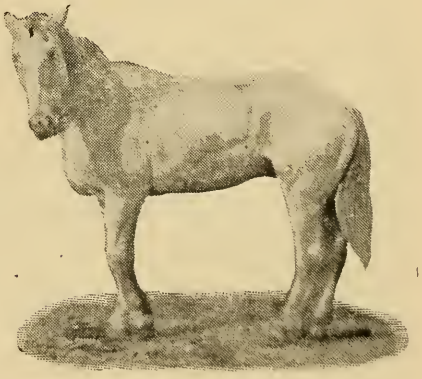


Fig. 89—Cerebro-Spinal Meningitis. Walking in a circle.

quickly regain his feet, and continue doing his work. If taken to water he will now draw eight or ten times before he is able to make one swallow, and will then proceed taking small swallows after each draw. At this time he eats as well as usual, and there is no perceptible change in pulse. This stage of the disease may be treated successfully.

Fig. 90—Cerebro-Spinal Meningitis. Showing delirium.

If the disease is allowed to run on unchecked, the horse, about the sixth day, will be able to swallow only a very small quantity. He can swollow easily enough, but the tongue being pararlyzed, he is not able to draw the water into the œsophagus. In eating grass, he will nip until his mouth is full, and then, owing to the tongue being paralyzed, the grass slips back out of the mouth. The horse continually bunches the grass. At this stage there will be a paddling gait, when exerted, and free sweat. Some may lie down to roll and not be able to get up without assistance. At this stage it is that the disease is first noticed by the owner, and here the prognosis is uncertain. Some recover under treatment, and some die. If the disease, at this stage, cannot be

Fig. 91 — Cerebro-Spinal Meningitis. Showing delirium with partial paralysis.

arrested, there will be trembling of the muscles of the body; he may eat short feed, but is unable to take long feed, owing to the tongue being paralyzed. The conjunctiva becomes greatly injected. The pulse now becomes more frequent and wiry. The temperature in most cases falls below the normal, but in some there is a rise of three degrees. The mouth is dry and the bowels remain constipated. The animal now begins to give way in the limbs, staggers, and ultimately goes down. He may die in a few hours after going down, or may live a day. I never undertake

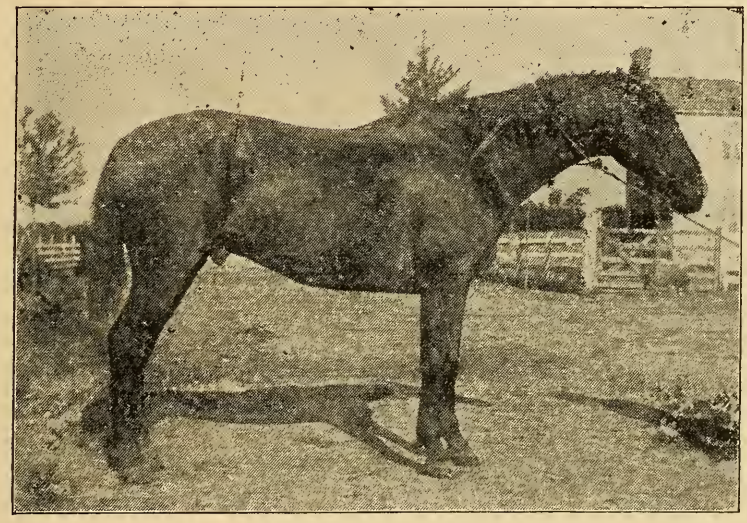


Fig. 92—A Complication of Spinal Meningitis.

the treatment of a case after the animal goes down and is not able to rise with a little assistance. The urine, in appearance, in some cases is normal, in some highly colored, in others almost black, or rather coffee-colored, which is due to the rapid decomposition of urea caused by unhealthy secretions from the walls of the bladder.

Symptoms.—Of the form in which it occurs in winter: The animal will be noticed to be duller than usual. This dullness generally lasts two or three days, when the horse is noticed to stumble. He shows excitement. In this form the disease approaches gradually in some cases, while in others it progresses

more rapidly. At this stage it can be easily cured. If not treated, the animal becomes nervous and excited. He has difficulty in drinking, but not to the same extent as in the condition previously described. While driving he will bear to one side, owing to the lobe of the brain on that side being more greatly affected with the disease than its fellow. The pulse may be a little below the normal in number of beats and a little wiry. He may lean against the fence and continue walking along, leaning to one side, or against the side of the stall. It is very difficult to get him out of his stall, and when out he is not able to walk straight back without assistance. If running loose in pasture, many cases will continue trotting or running around in the lot, as though driven on the road. At this stage it is first noticed by the owner. If treatment be now undertaken the prognosis is uncertain, although the majority recover. If the disease cannot be checked the excitement increases. The animal lifts the head higher than natural, or it is drawn back by the muscles. The conjunctiva becomes greatly injected. The animal now begins pressing forward, leans the head against the manger, and thumps his head against the corner of his stall. Some few cases can be cured at this stage of

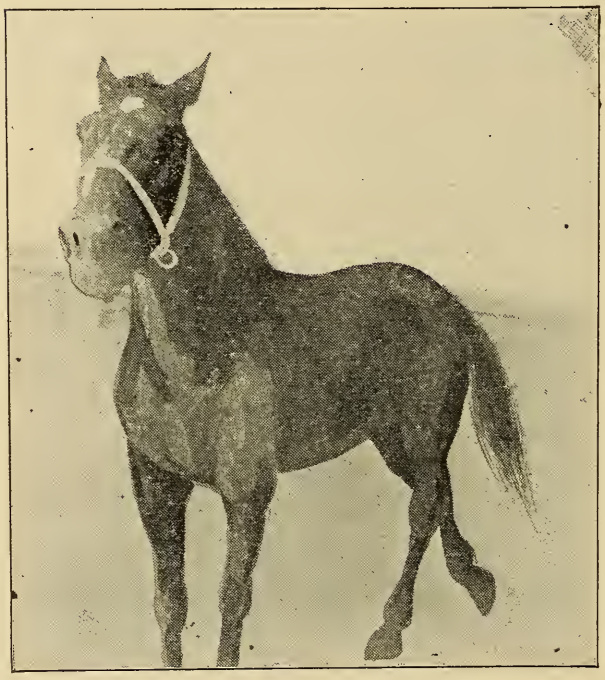


Fig. 93—Another Symptom of Cerebro-Spinal Meningitis. Showing the head drawn backwards and the distention of the nostrils from labored breathing.

the disease, but it is generally best not to attempt treatment. As the disease advances the patient becomes delirious, the eyes take on a wild, staring look, and he seems blind to all objects around him. He strikes his head against the stall with greater violence than before, utters the most horrible cries, goes down, and soon dies in great agony. It will be inferred from the above description that when seen in time the treatment of the disease is an easy matter.

Treatment.—The treatment should be with the view of eliminating the poison from the body. In all cases, if the bowels respond to purgative medicines, we may expect a recovery. Especially is this the case with the first described form of the disease. I have never lost a case in this form of the disease where the bowels responded to purgative medicines. If the case has advanced too far for the bowels to become liquid, the patient will surely die. The action of the intestinal glands pouring out fluid relieves congestion and assists in eliminating the poison. The kidneys should be stimulated in order to get rid of as much poison as possible. By this means we can hold the disease in check until the secretion of the intestinal glands takes place. Eight drachms of aloes and one drachm of calomel should be administered as soon as possible. Nitrate of potash, one-half ounce; sweet spirits of nitre, one ounce; tincture of belladonna, one drachm; bromide of potash, one drachm, should be given in a pint of water every three hours, until four doses have been given, or until the bowels have responded; then give three times a day. One ounce of aloes should be added to the fourth dose. The same quantity of aloes should be given with the seventh dose. The bowels must be made fluid, and the purgative should be repeated until this is done. Many cases require six, seven, and even eight purgative doses, and I have given ten in forty-eight hours. If the bowels respond in twenty-four hours, the horse, in two days, requires no further treatment. Ice in a sac should be applied to the head and kept up for twenty-four hours. Blisters may be applied to the spine. I seldom use slings. My experience has

been that where it is necessary to use slings, the case is beyond treatment; however, there are a few cases where the slings may be used to advantage. The appetite should be kept up, if possible. If it be in the summer season, green food in small quantities should be offered, such as green grass or tender and growing corn blades. Some few cases recover slowly, and show symptoms of paralysis for some time. Such cases should not be worked under thirty days.

XXX.

DISEASES OF THE RESPIRATORY ORGANS.

It will be necessary here to point out the different methods of making a physical examination, by which the diagnosis of these diseases is accurately traced. Auscultation is listening to the sounds of the interior by means of the ear applied to the surface of the body. It may be practiced directly by the ear or by an instrument called the stethoscope. In applying the stethoscope to the chest, its funnel-shaped end is to be held firmly to the surface and the opposite end must press closely to the ear. Immediate auscultation does very well. The ear should be accurately applied to the skin; a handkerchief or thin cloth may be allowed to intervene.

Percussion.—This consists in striking upon the surface with the view of eliciting sounds, by the nature of which an opinion may be formed as to the condition of the interior parts. It is either immediate or mediate. In immediate percussion the ends of the fingers are brought together and supported by the thumb, and the parts are struck perpendicular to the surface. The knuckles or closed hand may be used.

In immediate percussion, the pleximeter is generally a flat, oval, or circular piece of ivory, on the left index finger of the operator.

NASAL SOUNDS.

The normal condition is simply a soft, blowing sound, heard only when the ear is placed to the nostrils.

Snoring is caused by a polypus, thickening of the Schneiderian membrane or some other obstruction of the nasal chambers. A snuffling sound is accompanied by a discharge as a result of some disease. Whistling may be due to a tumorfied condition of the

Schneiderian membrane. Sneezing or snorting is an indication of an irritation in connection with the Schneiderian membrane.

LARYNGEAL SOUNDS IN HEALTH AND DISEASE.

In health the sound is that of a soft to-and-fro sound. The laryngeal sounds of disease are many.

Grunting.—When the animal is struck or pulls heavily, he grunts. This is normal with some horses; but the grunt is to be regarded with suspicion, and the animal should be thoroughly tried for its wind. It is frequently a forerunner of roaring.

Whistling is a modification of roaring, and is an unsoundness.

Roaring.—This consists of a loud, unnatural sound emitted during the inspiratory act. It is a symptom of acute laryngitis; if such, it only indicates temporary unsoundness. It is generally found, however, to be due to disease and wasting of the muscles of the larynx. It is then an unsoundness.

COUGHS.

A cough is produced by a violent expulsion of air from the lungs over the vocal chords. It is a symptom of various diseases.

The dry cough is symptomatic of a dryness of the respiratory mucous membrane. The cough of pleurisy is a dry, painful, and prolonged cough. The hollow cough is a symptom of chronic disease. The moist cough indicates an inflamed and humid condition of the respiratory mucous membrane. The broken wind cough is a suppressed, deep, hollow cough.

In connection with the trachea, there are what is known as tracheal rales, a peculiar rattling in the throat. This is a symptom of death.

THORACIC SOUNDS.

The normal respiratory murmur is a soft diffused murmur of a gentle, breezy character. The length of expiration is about one-fourth that of inspiration. The normal bronchial sounds resemble the blowing of air quickly through a tube. The sound is dis-

tinct over the middle and upper third of the chest. In the ox it is heard lower down. The sound produced by percussion in the normal chest is of a resonant character. It is very clear immediately behind the shoulder to the twelfth or thirteenth rib, where it gradually diminishes.

The abnormal sounds heard in the thoracic cavity are, first, a sonorous, murmuring sound, caused by narrowing of the large bronchial tubes. This is termed rhonchus. It may be heard in front of the chest and behind the shoulder.

Sibilant Rale.—By this is meant a whistling, hissing, clicking, wheezing sound. It is associated with bronchitis, and is heard in the region of the bronchial tubes.

Mucous Rhonchus, or Rale.—The bursting of bubbles of some size, varying in number, modified by coughing and expectoration. The sound is due to bubbling of air through the liquid. This is seen in the moist stage of bronchitis.

Crepitations.—This sound is compared with that produced by rubbing slowly and firmly between the finger and thumb a lock of one's hair near the ear. This is best heard in the lower third of the chest.

TUBAL OR BRONCHIAL SOUND.

When this sound is heard over the inferior portion of the thorax, it indicates some degree of consolidation of the lung.

Absence of Sound.—When this occurs, it indicates that the exudation is excessive in quantity, and that effusion has taken place in the thorax.

PLEURAL SOUNDS.

There may be heard a rubbing or grating sound during inspiration and expiration. It is caused by rubbing together of the two opposed surfaces of the pleura, chiefly heard at the lower part of the chest.

PNEUMONIA.

Inflammation of the Parenchyma or Lung Substance.—One or both lungs may be affected. When both lungs are affected to any great extent, death is the usual termination.

There are three stages of pneumonia. The first stage is that of hyperæmia, characterized by an excess of blood in the part. When a portion of the lung will float on being placed in water, the condition is known as splenization.

The second stage is known as red hepatization. At this time the lung has undergone a more or less destructive process, and will readily sink on being placed in water. In case the patient should recover from this condition, the exudate will be removed, after liquefying, by the process of absorption.

The third stage is gray hepatization, in contra-distinction to red hepatization.

Cause.—Exposure to cold and wet, sudden chills, housing in cold, draughty stables. It may be caused by irritating gases, by smoke, foreign bodies entering the lungs. Medicine of an irritable character finding its way into the lungs may produce pneumonia. It is most frequently seen in sudden changes in the weather, or when the animal is allowed to cool down too suddenly after heating.

Symptoms.—The disease is ushered in by rigors. Respirations are affected slightly at first. The pulse beats about eighty per minute; the temperature rises to 104 to 106 degrees. A dry, dull cough is present. The ears and legs are alternately hot and cold. The animal does not lie down, but will wander about in his stall in a listless manner, and may take a mouthful of food at intervals. The respirations vary according to the severity of the disease. The horse will seek fresh air. Percussion, if over the region of the diseased lung, yields a dull sound. The right lung is more frequently affected than the left. In cases likely to terminate fatally, the pulse runs up, becoming quicker and weaker, and the respirations become increased. The nostrils flap, with a brownish

or rusty colored discharge from the nose; the eyes take on an amaurotic stare, and the animal becomes unconscious of everything around. The pulse can scarcely be felt, and the body is deathly cold. He may lie down, turn his head to one side, and finally throw it back straight and breathe his last, or may rise to his feet and drop. The horse never, for any length of time, lies down in pneumonia. If he should lie down, he will at once get up.

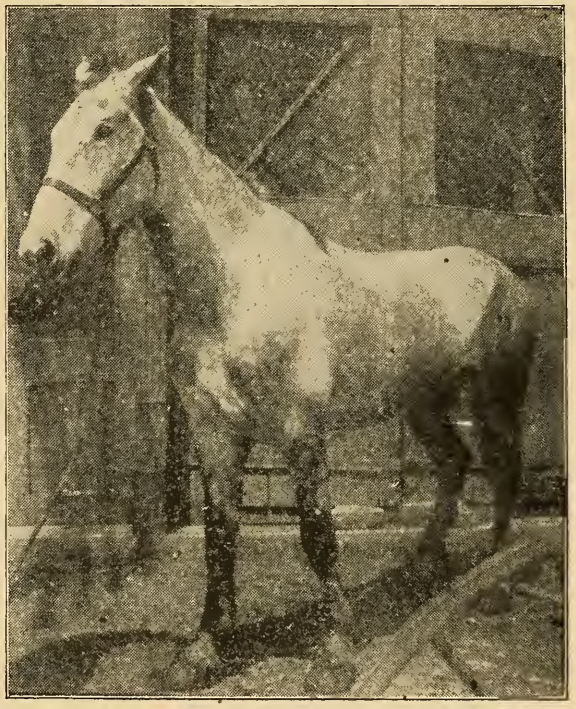


Fig. 94—Pneumonia. See the haggard look, the anxious expression of the eye, the labored breathing as indicated by the nasal opening.

Treatment.—Place the patient in a well-ventilated loose box, free from draughts. Clothe the body according to the season of the year. Locally, mustard plasters are to be applied to the lungs, six ounces to one pint of water, and covered with ordinary newspapers. Bran-poultices also should be applied to the lungs. A bushel of bran should be divided into two equal parts and placed in two wide bags. Boiling water should be poured on the bran, and the poultice applied as hot as can be borne. Tie the sacks together and throw them across the horse's back and buckle down tightly, or tie with a long rope that will extend around the body twice. The rope should draw on the anterior and posterior part of the sack, and be drawn tightly, and the blanket should be put over this. Place a bucket of cool drinking water in the stall and give the liquid foods mentioned in the chapter on Feeding the

Sick. Anything the animal will take should be given in small quantities. If given in large quantities and allowed to remain in the trough it will only disgust the patient. The mustard applications may be repeated three or four times, and should be used alternately with poultices. If the fever be high, tincture of aconite, twenty drops; nitrate of potash, three drachms, should be given at intervals of four hours. When the circulation is weak, stimulants should be given, as liqua acetate of ammonia, in two-ounce doses every four hours. An ounce of sweet spirits of nitre is useful. Three-drachm doses of potassium iodid may be given twice a day during convalescence. It is safer, as a general thing, to make a judicious use of stimulants from the beginning; nitrous æther, one ounce; sal. acetate of ammonia, one ounce, diluted in one pint of water, is the best and should be given every four hours.

PLEURISY.

This consists of an inflammation of the pleura. When the pleura and the lung substance itself are inflamed, we call it pleuro-pneumonia. The pleura is the serous membrane that lines the thoracic cavity and covers the viscera of the thorax.

The causes are similar to those of pneumonia. Nearly all cases of pleurisy terminate in effusion of serum, constituting limited hydrothorax.

Pleurisy may be double or single, but generally it is single, and confined to the right side.

Symptoms.—It is characterized by a chill at the beginning. There is coldness of the body, a wiry pulse, and a painful cough. The animal becomes stiff and sore, and if approached or turned around suddenly he will groan. During the act of respiration, the ribs are fixed, a hollow line extends along the inferior border of the false ribs. The muscles over the affected part quiver, and great soreness will be observed. On auscultation, a crepitating sound can be heard, caused by the pleural membranes moving over each other. The cough accompanying pleurisy is of suppressed character.

Within four to six days the animal becomes quiet, and seems to be free from pain. This is a sign that effusion of serum has taken place. In this disease, as in pneumonia, the animal stands with the elbows turned outward.

Treatment.—It should be treated similar to pneumonia, but mustard applications should not be laid on as frequently as in pneumonia. A half ounce of potassium nitrate; camphor, one drachm; aqua, one pint, may be given. Digitalis, one drachm; potassium nitrate, three drachms; water, one-half pint, should be tried.

Fig. 95—Pleurisy. Showing the hollow line extending along the inferior border of the false ribs during the act of respiration. See drawn-up and fixed position of the abdomen and chest.

Hydrothorax.—This condition arises from an effusion of serum, of a port-wine color, into the cavity of the chest. It is the result of pleurisy.

Symptoms.—The respirations are difficult, and there is flapping of the nostrils. On auscultation no sound can be heard in the inferior thorax. Odematous swellings are seen along the belly and limbs.

Treatment.—The treatment must be directed to the removal of the fluid, which may be absorbed by giving good, nutritious food. The liquid food, especially the milk preparations mentioned in this work, should be given in half-ounce doses. Powd. gentian, three drachms; powd. sulphate of iron, three drachms; powd. nux vomica, one drachm, should be given in the feed night and morning. In some few cases it may be necessary to have the

surgeon perform the operation of paracentesis thoracis, or tapping. The fluid should be removed by the trocar and canula, which should be inserted in the space between the eighth and ninth rib.

CONGESTION OF THE LUNGS.

This gives rise to a partial or complete arrest of pulmonary circulation. The blood is detained in the parts, causing functional derangement of the lungs. It is a forerunner of pneumonia.

CAUSE.—The disease is caused by standing idle during the bad winter months and being put to severe exertion all of a sudden when spring opens us. It may result from working a horse while suffering with other pulmonary affections. It is also produced by exposure to rain when overheated. I saw two cases produced from this cause in a pasture in one night. The colts were turned into the field, where they ran and played for some time. Late in the night a heavy rain came up, and they contracted the disease. I saw them the following evening just before their death.

Fig. 96—Congestion of the Lungs. See the flapping of the nostrils, the deadly stare, the pressing forward with the forelimbs under the body—the forelimbs wide apart.

SYMPTOMS.—The animal is observed to shiver; all food is refused; the mouth is hot, the extremities are deathly cold; the pulse beats eighty or ninety per minute. There will be a peculiar flapping of the nostrils, the flanks heave rapidly; the eyes are blood-shot. In some cases there will be a discharge of frothy blood from the nose.

Treatment.—Place the animal in a comfortable box stall and have his limbs rubbed vigorously for some time. He should be well clothed. Sweet spirits of nitre, in two-ounce doses, should be given and repeated in two hours. Whiskey, or alcohol in any of its forms, may be given, and enemas should be given. Cloths wrung out of hot water may be applied to the sides. One to two ounces of the tincture of arnica is recommended by Prof. Williams. Whiskey and gentian may be given during convalescence. The food should be good, and should consist of anything the animal will take. Some of the preparations mentioned in this work should be used.

CATARRH.

This is simply a common cold—a running at the nose.

Symptoms.—Sneezing, watering of the eyes, dryness of the mucous membrane of the nose, succeeded by a discharge, at first thin and colorless, which soon becomes yellowish-white and profuse.

Causes.—Alterations in temperature, hot, ill-ventilated stables, exposure to wet, a sudden change of temperature. If the cold be neglected, a catarrhal inflammation is apt to spread from the nose over the whole surface of the respiratory membrane.

Treatment.—This is simple, if in time. Place the animal in a comfortable, loose box, well ventilated. Clothe the body and give good food. The animal should be made to inhale steam by holding its head over a bucket of hot water, at the same time stirring the water with a wisp of hay. A few doses of the nitrate of potash in the usual amounts are beneficial. In more severe cases nitrous æther, one ounce; potassium nitrate, three drachms, should be given every four hours. It must be remembered that no purgative medicine is admissible in respiratory diseases. The bowels should always be moved by enemas and laxative food. If there is a severe cough present, liniments of a stimulating character may be employed, as the ammoniacal liniment. If the discharge has a tendency to become chronic, sulphate of iron, in

three-drachm doses, should be given in the feed. Particular attention should be paid to the food, which must be of the best character. Green food is highly beneficial.

LARYNGITIS.

This condition consists of an inflammation of the mucous membrane of the larynx. It is indicated by a discharge from the nose, difficult breathing, and febrile disturbances.

This is a very grave affection, sometimes killing quickly. Sometimes it leaves a thickened condition of the mucous membranes. This swells and closes the glottal opening, and the animal dies from suffocation.

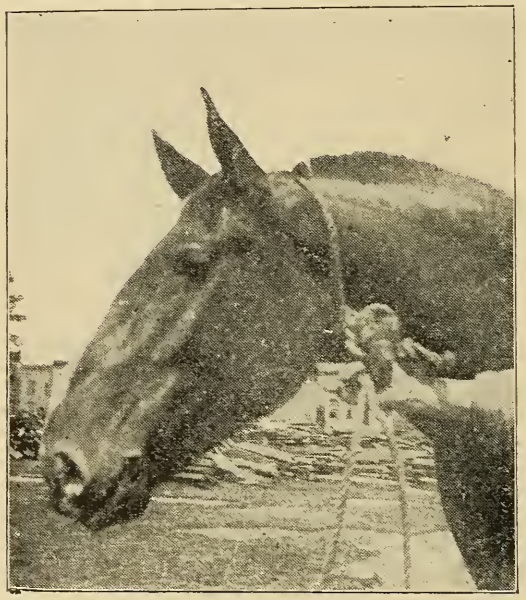


Fig. 97—Laryngitis. Showing protrusion of the nose in an endeavor to bring the air passages as nearly on a straight line as possible.

The various conditions causing laryngitis are about the same as those causing simple catarrh.

Symptoms.—The first symptoms are dullness and a difficulty in swallowing. When drinking, the water returns through the nose. The animal's nose is protruded, the respiratory passages thus being brought as near on a straight line as possible. The conjunctiva is red, and tears flow from the eyes. The nasal chambers are red; a hoarse, rasping cough is present, and sweats bedew the body. The legs and ears are cold, and the animal will manifest his distress by stamping his feet. The pulse, at first hard and full, becomes rapid and indistinct. The membranes assume a livid hue, and the animal falls and dies. Milder cases are simply modifications of the above. There may be swelling of the limbs

and a discharge from the nostrils, which, if profuse and coming away freely, is to be regarded as a favorable sign.

Treatment.—Secure an abundance of pure air; place the patient in a comfortable, loose, box stall. Hand-rub and flannel-bandage the limbs. Administer the medicine, if possible, in the drinking water. If he will not take it thus, it must be given in a draught, using plenty of water to dilute the medicine. Inhalations of steam and hot fomentations to the throat should be tried, and if the distress is not quickly relieved, tracheotomy must be resorted to. Where the case is not so urgent, the fomentation and the use of the ammoniacal liniment to the throat will usually suffice. Chlorate of potash should be dissolved in the drinking water, and twenty drops of the tincture of aconite, in conjunction with alcohol or æther, may be given in a drench; one ounce of either may be given. The results of laryngitis are thickening of the mucous membrane, ulceration of the rima glottidus, atrophy of the laryngeal muscles, and follicular growths upon the laryngeal entrance. Thickening of the mucous membrane is best treated by putting the animal on a course of potassium iodide; three drachms should be given three times a day. Ulceration of the rima glottidus is treated with a solution of the nitrate of silver. It should be applied by a little piece of sponge fastened to a rod. The follicular growths are removed by the application of a solution of corrosive sublimate. To prevent atrophy of the muscles, the chlorate of potash should be used, in two-drachm doses.

BRONCHITIS.

Bronchitis may be defined as an inflammation of the mucous membrane lining the bronchial tubes. It is sometimes called Catarrhal Bronchitis.

Causes.—Bronchitis is due to exposure to cold. It frequently arises during voyage at sea and by improper administration of medicine, as through the nostrils. Mechanical bronchitis may be produced by food gaining access to the trachea.

Symptoms.—The disease begins with a chill, soon followed by febrile symptoms. There will be a husky, dry cough, and the animal will retain the standing posture. The pulse is quickened, rhonchus is heard by auscultation, and the bowels are constipated. Soon there is a discharge from the nose; if yellow, it is a favorable symptom.

Treatment.—The animal should be made to inhale medicated steam, which may be medicated with camphor, creosote, or carbolic acid. The steam facilitates the passage of the fluid from the bronchi. The sides may be stimulated with mustard and water, or stimulating liniments. Where the cough is very distressing, camphor, belladonna, and digitalis, a drachm of each, should be given three times a day. In the primary stages of the disease, a strong opiate may be given, as opium tincture, two ounces. If the bowels are constipated, a pint of linseed oil should be given.

Bronchitis may terminate in thick wind.

PULMONARY EMPHYSEMA.

Asthma, Broken Wind, or Heaves.—This is a dietetic disease of a non-inflammatory nature, characterized by difficult respiration, and the presence of a prolonged and deep cough.

Cause.—It is caused by injudicious feeding, allowing the animal to overload his stomach, feeding on dusty hay, or bulky or dusty food of any kind. Cold and exposure exercise some influence in producing the disease, and it may result from an attack of bronchitis.

Symptoms.—There will be noticed a heaving of the flanks, which will be greatly increased when the animal is put to severe exertion. This is a peculiar bellows-like movement of the flanks. The inspiratory act is performed regularly and easily, while the expiratory act is difficult, and accomplished in a violent manner. Another well-marked symptom, and all that is necessary to diagnose this condition, is a loud, deep, prolonged, and sonorous cough. This cough is peculiar to broken wind, and will be readily recognized, if ever once heard.

TREATMENT.—A permanent cure cannot be made if the disease has been running any length of time. The case may be benefited by treatment, and the symptoms removed by judicious treatment and proper food. I have kept a number of horses affected with this disease going through the driving season, without recurrence of the symptoms, by giving an occasional purgative, and feeding on small and regular quantities of wet bran and oats, to which was added three ounces of linseed oil and three ounces of lime water. This was mixed with each feed for several weeks at a time. The water was given in measured quantities, in order that the stomach should not be overloaded. Internally was given calomel, camphor, opium pulverized, digitalis, of each a half drachm, made into a bolus and given twice a day for a week at a time; and then arsenious acid, grains two; sulphate of iron, two drachms, were substituted. Drachm doses of nux vomica were also given.

Low horse dealers frequently administer lead pellets, large doses of oil, which, acting mechanically, will relieve the symptoms for the time being. A strong purgative of any sort will relieve the symptoms, as will the reduction of food for a few days.

LARYNGISMUS PARALYTICA.

This condition gives rise to roaring, which may be defined as breathing with a loud and unnatural sound. It is due to paralysis or atrophy of the dilator muscles of the neck. The muscles involved are the crico-arytenoideus, posticus and lateralis, the arytenoideus and the thyro-arytenoideus.

The muscles are atrophied, or paralyzed, from various diseases which affect the larynx. The loosely flapping parts of the larynx no doubt produce the roaring sound. It is an unsoundness in all its stages. To detect a roarer, he must be put to a severe test; have the animal galloped for some distance by an assistant, who may pull him up suddenly in front of you, when wheezing, whistling, or roaring may be heard by placing the ear to the trachea. If he is a roarer he may be heard at a great distance.

Wheezing and whistling are modifications of roaring, and all of them are incurable. Another method of testing an animal for roaring is to have the animal gently trotted, after which he is to be coughed; attention should be paid to the character of the cough, after which the animal is to be placed by a wall, his head firmly held by the attendant. The examiner now makes a feint, as if to strike. The animal will start, and emit the grunt peculiar to roarers.

Treatment.—Give good food, made free from dust by dampening. The ammoniacal liniment—viz., equal parts of ammonia, turpentine, and linseed oil—should be applied to the larynx externally, and potassium iodide, in three-drachm doses, may be used internally. The animal should be put on a course of chlorate of potash, which will help to restore the muscles of the larynx.

Trachitis.—Inflammation of the mucous membrane lining the trachea. This may be due to the presence of a foreign body, or may exist as a complication of laryngitis.

Symptoms.—The breathing is somewhat difficult, a rattling sound may be heard over the region of the trachea. A nasal discharge is present.

Treatment.—Clip the hair over the course of the trachea and apply the ammoniacal liniment. Mustard may be applied, if the liniment is not at hand. Potassium chlorate and nitrate should be used internally. If there is much fever, aconite, twenty drops at a dose, may be given. Keep the animal in a comfortable place and give good food.

HAEMOPTYSIS—HEMORRHAGE FROM THE LUNGS.

This is usually caused by severe exertion when not in a suitable condition. It is generally met with in the race horse. A plethoric animal put to extra exertions will sometimes suffer hemorrhage.

Symptoms.—The blood flows from both nostrils, a cough is present, a rattling or gurgling sound is heard over the region of the trachea. If the animal loses a considerable amount of blood, there will be blanching of the visible mucous membranes and coldness of the extremities.

Treatment.—If weak, give stimulants, such as alcohol. Cold water or ice should be applied to the sides of the chest. Tincture of perchloride of iron, in three-drachm doses, should be given. Turpentine in ounce doses should be given. Gallic acid and opium may be tried. The animal should not be put to any great exertion for a long time after hemorrhage has taken place.

EPISTAXIS—BLEEDING FROM THE NOSE.

Bleeding from the nose may occur as a symptom of various diseases, or may occur as a result of an injury. The blood flows from one nostril as a rule, but may flow from both nostrils.

Treatment.—A solution of the perchloride of iron should be injected into the nostrils. Alum may be tried. Plugging of one nostril may be necessary. A string should be tied to the plug for the purpose of removing it. Ice water should be applied externally.

PHARYNGEAL POLYPI.

These are occasionally seen in the pharynx, having a constricted base. They give rise to a discharge from the nostrils. The animal may show signs of suffocation and then recover in a few minutes. The throat should be examined; if the polypus has a constricted base, its removal is advisable. If, on the other hand, it has a broad base, it had better be left alone.

Osseus tumors occur in the nasal cavity, and give rise to difficult breathing as a result of obstruction.

Treatment.—Prompt removal of the growths by the forceps or bone saw; they must be moved when accessible.

Cysts.—Cysts form in connection with the false nostril, containing a cheesy matter. The cyst should be lanced and dressed with carbolic acid, one part to forty of water.

NASAL POLYPI.

These growths are of a fibrous character. They become larger and obstruct the air passages. If situated low down, they can be easily seen. They should be removed with the ecraseur, or grasped, at their necks, with a forceps and twisted off.

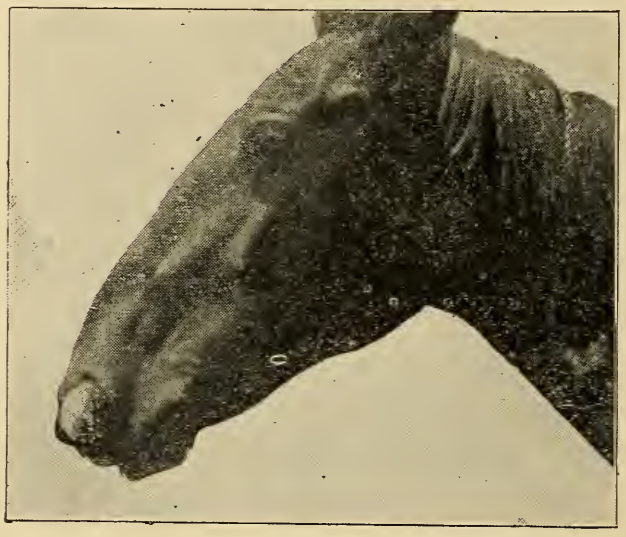


Fig. 98—Nasal Polypi.

NASAL GLEET

Is a catarrhal disease, characterized by a defluction from the nostrils. It may arise, however, from other causes than catarrhal inflammation, such as external injury and disease of the upper molars. It may result from a sub-acute inflammation of the mucous membrane lining the nasal chamber, or from a neglected case of simple catarrh; by long exposure and neglect, or from injury, or caries of the teeth. In catarrhal affections the lining membrane of these sinuses, by extension of the inflammation of the Schneiderian membrane, becomes diseased, and pours out a quantity of pus, which, lodging in the various compartments of the sinuses, becomes a source of irritation, which, if not removed, will cause absorption of the bony plate.

Symptoms.—There will be an irregular discharge from one nostril. The discharge at first is white; after awhile it becomes more yellow and adheres to the nostrils. Percussion over the region of the sinuses yields a dull, dead sound. The eye on the side that is affected will look dim, the upper lid will often droop a little, and there may be a rough appearance of the hair over the

region of the part diseased. The breath from the nostril on the diseased side may be very offensive, indicating diseased bone.

TREATMENT.—Place the animal in a comfortable, loose box, and give good food. The nostrils should be kept clean by sponging. Potassium iodide, cupri sulphate, of each three drachms, and add ten grains of powdered cantharides. Iodine and iron,

Fig. 99—Nasal Gleet Affecting Both Nostrils.

forming ferro-iodide, should be given in three-drachm doses twice a day. Sulphate of iron, three drachms; acid arsenious, grains five, given twice a day, is highly thought of. Nux vomica in drachm doses may be used. The nasal chambers should be injected with carbolic acid, two drachms to a pint of water. When pus accumulates in the sinuses, the operation of trephining must be performed. This will require the employment of a surgeon.

The operation is very simple. The sinus should be opened an inch superior and posterior to the termination of the zygomatic spine. After trephining, the cavity should be syringed with a solution of carbolic acid in tepid water. If the turbinated bones are affected, the case will be a stubborn one to treat.

XXXI.

DISEASES OF THE STOMACH AND INTESTINES.

SIMPLE INDIGESTION.

Indigestion is frequently met with, and occurs as a result of errors in feeding, or improper care of the teeth. To remedy these causes read carefully the chapter on Feeding.

Symptoms.—The animal falls off in condition, the coat becomes dry and dusty looking; slight and frequent attacks of colic may occur; the bowels are irregular, first constipated, then loose.

ACUTE INDIGESTION.

Acute indigestion is a very common and fatal disease. There

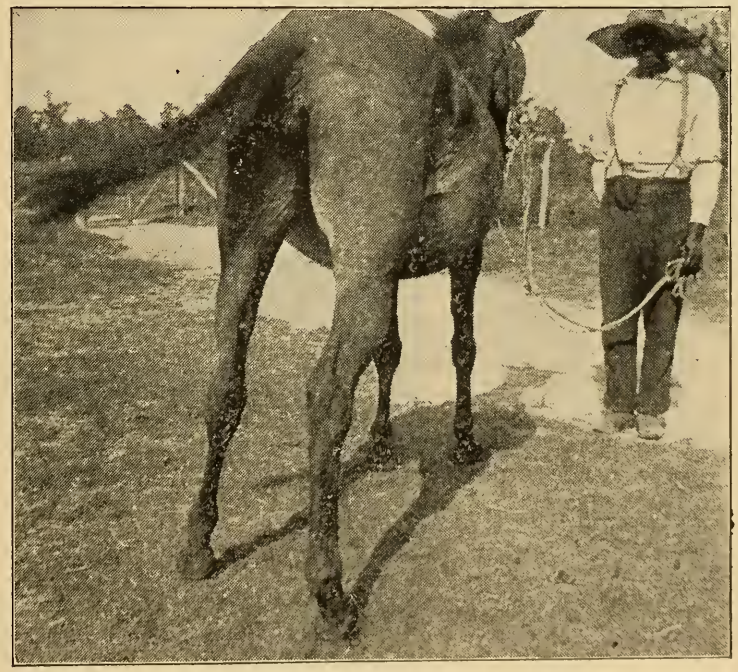


Fig. 100—Acute Indigestion.

is considerable distention, due to a large quantity of food in the stomach and the evolution of gases arising from the fermentation

of the food; the gases formed are sulphuretted hydrogen, carburetted hydrogen, and carbonic acid gas.

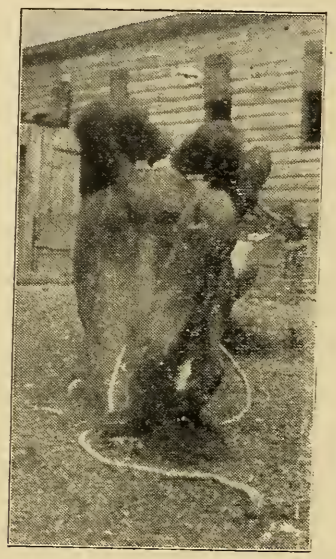


Fig. 101—Acute Indigestion. Balancing on back.

Causes.—It results from over-abundant food, greedily swallowed and imperfectly masticated, or from feeding in large quantities when the stomach is tired and weak. Certain kinds of food are more likely to produce it than others. Corn is the most usual cause of the disease. Wheat and barley will also produce the trouble.

Symptoms.—The animal generally falls sick after exercising on a full meal. He becomes uneasy, cringes and turns his head to one side. If forced, he may go along without showing much pain. The severe pains come on again, and the abdomen is distended with gas. He will roll from side to side, and frequently tries to balance himself on his back. If there is extreme distention, there will be noticed eructation of gas from the stomach and flatus by the anus. This is a favorable symptom if it comes away freely. The animal gets relief almost instantly. In cases likely to terminate unfavorably, the rectum protrudes and is irritable. An enema given will not be retained. The mouth becomes cold and clammy, cold sweats bedew the body, the eyes take on an amaurotic stare; the animal walks about in a semi-unconscious condi-

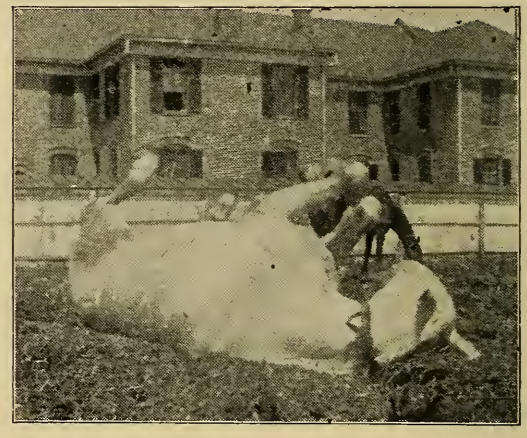


Fig. 102—Acute Indigestion.

tion, occasionally staggering and finally falls to the ground and dies.

TREATMENT.—Give as early as possible eight drachms of aloes. Enemas in this affection are of the greatest possible benefit, severe cases being sometimes entirely relieved by enemas alone. In preparing the enema, enough soap should be used to make it slippery. A little soda or turpentine may be added to the first enema. The soap should be omitted after the second enema. In cases of extreme distention, the animal must be held so that he may not throw himself and rupture the stomach or bowels.

Tincture of opium, two ounces; sweet spirits of nitre, two ounces, in a drench, should be given to relieve pain. Turpentine in two-ounce doses is preferable to the spirits of nitre in extreme distention. If relief is not afforded by the first draught a second may be given in thirty minutes.

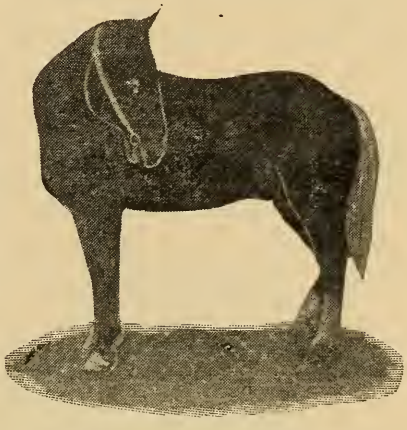


Fig. 103—Impaction of the Stomach.

Carbonate of soda and carbonate of ammonia, of each three drachms, will remove the gas and prevent further accumulation. Turpentine, applied externally to the abdomen and administered internally, is highly useful in removing gas. In some few cases it becomes necessary to puncture the bowels and allow the gas to escape. The relief is almost instantaneous, the operation causes but little inconvenience, and is successful if employed in time. Hypodermic injections of morphine, in three to five-grain doses, may be given to allay pain, instead of using the drench.

IMPACTION OF THE STOMACH.

Impaction of the stomach occasionally takes place, caused by feeding greedy eaters on coarse food, such as coarse straw not well cut used in chop feed.

Symptoms.—There may be some gas present, but generally there is not. The animal paws and rolls, turns his head to his side; the pulse becomes quick and weak and, unless relieved, he dies.

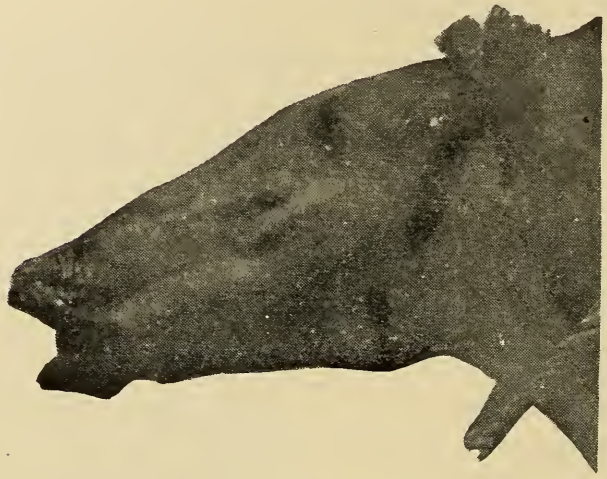


Fig. 104—Nausea.

Treatment.

Give eight drachms of aloes in conjunction with one drachm of calomel, and follow with opium tincture, two ounces; nitrous æther, two ounces. Enemas should be freely given. A decoction made by boiling tobacco, one ounce to four pints of water, may be used as an enema. An ounce of alcohol may be given as a stimulant.

RUPTURE OF THE STOMACH.

This may occur as a result of acute indigestion or may occur from blows.

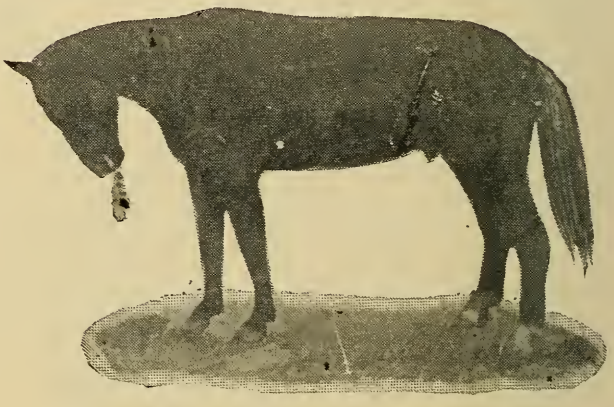


Fig. 105—Rupture of the Stomach.

Symptoms.

The symptoms of this condition as a rule, enable us to diagnose with some accuracy, but they may be misleading. If the animal vomits, turns around in a circle, lies down and sits up on his haunches like a dog, with eyes in amaurotic state, and cold sweats on the body, there is reason to believe that rupture has taken place. Rupture of the stomach is invariably fatal.

CHRONIC INDIGESTION

Is produced in various ways, and is characterized by an unthrifty condition in general. The coat is dry and staring. The animal may be subject to slight attacks of colic, slight diarrhœa, or constipation. The liver is frequently affected by chronic indigestion, in which case there will be a yellowish tinge of all the mucous membranes. The animal may have a ravenous appetite, and on the following day refuse food.

Treatment.—Give six drachms of aloes together with a half drachm of calomel. Place rock salt in the trough. Alcohol in its various forms is beneficial. Charcoal may be used with benefit, as also bicarbonate of soda in three-drachm doses three times a day. He should finally be put on a course of nux vomica. This should be given in drachm doses of the powders twice a day.

GASTRITIS.

Inflammation of the stomach is generally caused by taking medicines of an irritable character, as arsenic poisoning, etc.

Fig. 106—Inflammation of the Stomach.

Symptoms.—The animal manifests great pain, the pulse runs down. The case is difficult to diagnose in the horse, but in the dog the diagnosis is easy.

TREATMENT.—The cause of the inflammation should be ascertained. If found to be due to arsenic, the hydrated sesquiocide of iron should be administered. The principal poisons and their antidotes will be given in future pages of this work. Inflammation of the stomach is invariably caused by some irritating poison.

SPASMODIC COLIC.

Spasmodic colic, or spasm of the intestines, is the most common of all bowel diseases. It is known as gripes, belly ache, etc. It consists of a spasmodic contraction of the muscular coats of the intestines, which may ultimately end in inflammation.

CAUSES.—It is due to improper food, sudden changes of diet, exhaustion from over-work, large draughts of cold water when heated or fatigued, or a combination of them all. Sudden change

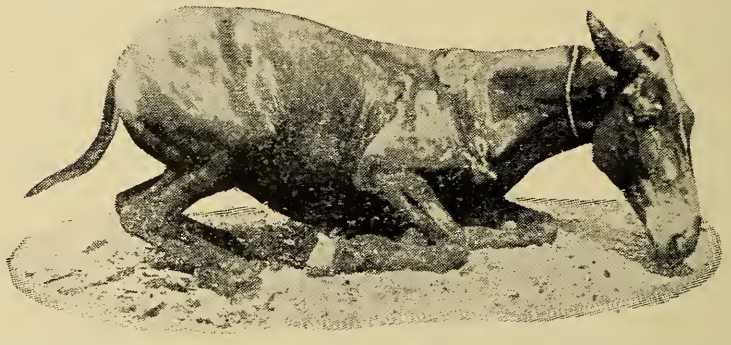


Fig. 107—Spasmodic Colic. Early stage of the disease.

in temperature is said to produce it. It is seldom fatal, and never of very long duration, if treated.

SYMPTOMS.—Spasmodic colic usually affects the small intestines. When it is purely intestinal, the symptoms are sudden pain, pawing, rolling, and struggling in many ways, then rising, shaking himself, and being almost free from pain for awhile. After taking a little food, the animal may begin to twinge, draw himself to one side, look at his side, whisk his tail, stamp and paw. He rolls and tumbles, suffering greater agony than from the first spasm. The spasms soon become more frequent and intense. The animal makes frequent attempts to urinate; this often leads people who do not understand the nature of the disease to believe that the cause of pain is due to inability to urinate. The

neck of the bladder is spasmodically contracted and prevents the urine from passing; but when the spasms are relieved, he will lie quiet for some time, get up finally, shake himself, stretch out,

Fig. 108—Spasmodic Colic. Showing first symptoms.

and urinate freely. When this takes place it is evidence that the spasmodic contractions of the muscular fibers of the intestines have relaxed, and the animal is freed from pain. The animal

Fig. 109—Spasmodic Colic. Becoming severe and aggravated.

usually takes a little food between the paroxysms, but finally they may be so severe that he will not notice food. When the

paroxysm comes on, he turns round three or four times before lying down. When down he may try to balance himself on his back, and may kick viciously at his abdomen. In cases terminating favorably the spasms become less frequent and less severe. In fatal cases the paroxysms become longer and more violent, and ultimately terminate in death.

TREATMENT.—The treatment is very satisfactory if adopted in time. Eight drachms of aloes or one quart of linseed oil should be administered at once, followed by opium tinct., ounces two; æther nitrice, ounces two. The employment of this treatment, together with enemas, is all that is required.

The subcutaneous injections of morphine are very effectual, and act in from seven to ten minutes. Chloroform, chloral hydrate, sulphuric æther, and belladonna are useful in relieving pain. Two or three drachms of chloroform may be combined with the tincture of opium, or an ounce of the tincture of opium, one ounce of sulphuric æther, two drachms of chloroform, to a pint of water may be given. Chloral hydrate may be given in two-ounce doses.

The abdomen externally should be bathed with mustard and ammonia, or mustard and water. A diffusible stimulant, as good old rye whiskey, may expel a light attack.

IMPACTION OF THE COLON.

This is due to feeding on rough, coarse feed, such as straw cut long for mixing in chop feed.

The symptoms, aside from those of abdominal pain, are a tendency on the part of the animal to push backwards, to press the tail against a solid object, to resist, by straining, the introduction of the hand and enemas into the rectum. In some cases the hard and impacted mass can be felt by introducing the hand into the rectum. The stomach and small intestines are usually found to be more or less emptied of alimentary matter, or containing large quantities of fluid; the large intestines are distended with a mass of hardened material, the mucous membrane highly congested,

and sometimes caked to the fæces. Rupture of the colon sometimes takes place from the extreme distension.

Purgatives should not be pushed too strong for several days, but all the mild purgatives should be tried. If these fail, then it becomes necessary to employ more powerful remedies; but these

Fig. 110—Impaction of the Colon.

should not be used under five or six days. Eserine and pilocarpine should then be used hypodermically.

HAEMORRHOIDS, OR PILES.

The horse seldom suffers from piles, but the dog frequently is thus affected. There is, at first, congestion of the mucous membrane at the verge of the anus, and subsequently dilatation of the hæmorrhoidal veins, forming small tumors. These sometimes protrude, and bleed frequently. The diagnostic symptoms of piles are switching of the tail, and a tendency to rub it against the wall, pain during the act of defacation, and the fæces are tinged with blood. Examination of the anus will reveal the presence of

vascular tumors, and much congestion and swelling of the mucous membrane of the skin.

TREATMENT.—The cause is due to some obstruction of the portal circulation, constipation, or the retention of hardened fæces in the rectum. Hence, give enemas and allow a restricted diet. A laxative should be given, as a pint of linseed oil. An ointment, consisting of equal parts of oak galls and hog's lard, should be applied to the parts; the benzoate of zinc ointment is also a useful application.

IMPERFORATE ANUS.

A congenital malformation met with in all the domesticated animals, particularly in the pig. The intestine should be punctured and an artificial anus formed.

ENTERITIS.

This is, undoubtedly, the most rapidly fatal inflammatory disease to which the horse is liable. It often destroys life in the course of a few hours. As a rule, the inflammation begins in the mucous coat, and gradually extends to and involves the outer coats. A variety of causes have been assigned for enteritis, but the only recognizable causes are overfatigue, cold from exposure or from washing with cold water while the animal is heated. Superpurgation, irritating medicines, foreign substances, putrid waters, drinking cold water when the animal is heated, may cause it. It is seldom that a horse lives twenty-four hours after the first appearance of the disease. Mortification often takes place in three or four hours.

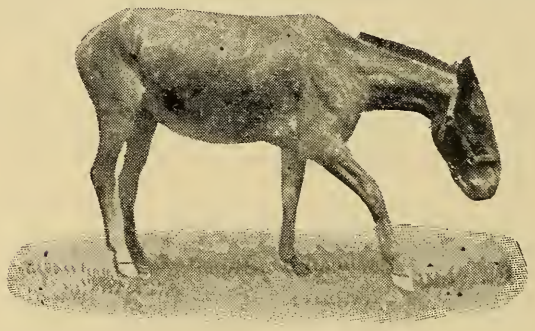


Fig. 111—Inflammation of the Bowels.

Symptoms.—The first symptoms are those of bowel trouble. The animal may appear dull for a day or two, when well-marked symptoms will be manifested. This dullness may not be noticed in some cases, the first symptom to attract attention being slight colicky pains. The animal paws continually first with one foot and then the other. If allowed to paw in dirt, he will dig a hole large enough to bury himself. He may cringe and look at his side. The pulse is hard, wiry, and somewhat quickened. The belly becomes tender on pressure. As the disease progresses, it becomes as violent as colic. The animal lies down more carefully than in colic, may walk in a circle four or five times before lying, and when he does lie down he does so with great care. When down, he will use every effort to prevent the abdomen coming in contact with the ground. Pressure upon the abdomen calls forth expressions of pain. There is a peculiar sighing breathing, and the pulse runs up from 80 to 120 beats. The face has a haggard expression, the eye becomes blood-shot and of a glassy appearance. Cold

Fig. 112—The slow, careful, and hesitating manner of getting down in Inflammation of Bowels.

Fig. 113—Careful and Easy Rolling in Inflammation of the Bowels.

sweats bedew the body, the belly becomes tympanitic and trembles incessantly; the legs, mouth, and ears are cold and the breath fetid, the lips pendulous, and the eye becomes more glassy. Gangrene sets in, the animal becomes quieter, wanders about in an unconscious condition, until, after a short interval, death closes the scene. If the symptoms abate in three or four hours after the attack, a favorable termination may be looked for. This, however, can scarcely be expected.

Treatment.—The first and most important step in the treatment is the administration of powdered opium; one, two, and even three drachms may be given in this case, succeeded by smaller doses. Subcutaneous injections of morphine, in five-grain doses, may be used. The tincture of belladonna in drachm doses may be administered every four hours. Hot fomentations should be applied to the abdomen, as flannels dipped into boiling water and rinsed out. Place dry cloths over this. Mustard applications are beneficial. Tincture of aconite, in twenty-drop doses, should be given. Stimulants may be tried and their effects watched. In some cases they do harm, and in other cases they are of benefit. If the appetite returns the liquid should be used for some time.

DIARRHOEA.

Diarrhœa is the term applied to all cases of simple purging in which the fæces are loose, liquid, and frequently discharged without any coexisting inflammation.

Causes.—A variety of causes produce diarrhœa, as rich food or sudden changes of diet; medicinal substances, derangement of the liver or digestive organs, grazing on poor, sandy pastures; violent exercise, and such foods as raw potatoes or frozen roots, as carrots and turnips. It may be induced by an effort of nature to discharge from the intestines something which is obnoxious, or it may occur as the breaking up of diseases. In such cases it should not be checked. Some horses are particularly prone to diarrhœa, such as highly nervous and long coupled horses. Such

horses start well on a journey, but before they have gone any great distance, commence to purge more or less freely. Such horses are hard to keep in condition.

Symptoms.—The symptoms of diarrhœa are the passing of an undue amount of liquid fæces. Slight griping pains may be manifested by the animal. The pulse becomes quickened, the animal weakens, and the extremities are colder than natural. Excessive thirst is manifested, and the animal is off his feed. If it be not checked it may terminate in enteritis, or farcy and glanders may supervene.

Treatment.—Endeavor to find the cause of the trouble. If due to an irritant, it is not safe to check it thoroughly; and on the other hand, if there is great weakness and prostration, it must be checked as soon as possible. Where nature is throwing off some offending matter, it must be assisted by a dose of linseed oil or castor oil. If there is prostration from undue passage of liquid fæces, it must be checked by giving opiates. The powdered opium should be given in drachm doses three or four times a day. Where the animal is not too weak, I think it best to administer a pint of oil. In cases where great weakness is noticed, it becomes necessary to check it at once by giving opiates as above mentioned. Boiled starch or flour gruel may be allowed the animal to drink, and the food should be of the best kind. If there be much fetor the hyposulphite of soda may be given in the feed in one-half ounce doses. Catechu and powdered chalk are highly beneficial. Prof. Smith recommends the use of catechu, a half ounce to an ounce; gentian, two drachms; ginger two drachms, and repeat in twelve or eighteen hours. Oil of turpentine, one ounce; opium, one drachm, beaten up with two or three eggs, is a good remedy. The intense thirst should not be gratified, and the animal should be allowed to drink only small quantities at a time.

DIARRHOEA IN FOALS.

This is a common occurrence when they are only three or four days to two or three weeks old. It is generally caused by some

altered condition of the mother's milk. It may be caused by cold, exposure, or fatigue, often by the foal receiving milk other than that of the mother, as skimmed milk.

Symptoms.—The symptoms are similar to diarrhœa in the adult. The fæces are liquid, of a yellowish-white color, and usually mixed with lumps. The colt falls off in condition, becomes weak and hide-bound, the belly is tucked up, and he staggers in his gait. If not quickly relieved it dies.

Fig. 114—Dysentery.

Treatment.—If the colt is a good, strong one, castor oil, two ounces, and opium, twenty grains, may be administered. An ounce of nitrate of potash, one ounce of sweet spirits of nitre in a drench should be given the mother. Lime water may be used with good results.

DYSENTERY.

The horse is not so liable to dysentery as is the cow and dog. The disease may result from some other disease, or may occur as an independent affection. The presence of irritants in the intestinal canal will produce it.

Symptoms.—The fæces are of a liquid character, tinged with blood. It may contain shreds of mucous membrane. There is

much straining, and the rectum and anus are irritable and inflamed. With the liquid fæces there may be hardened pellets, mixed with blood. There will be abdominal pain, great dullness, thirst, and rapid emaciation.

Treatment.—A pint of linseed oil should be administered, followed by opium and chalk, in similar quantities as recommended in the treatment of diarrhœa. Such stimulants as ale, beer, and whiskey may be used. Should these not succeed, styptics, as the oil of turpentine, or astringents, as tannic acid, alum, or the chloride of iron, may be used in three-drachm doses three times a day. The strictest attention should be paid to the diet. When the disease becomes of a chronic nature, cod-liver oil and eggs mixed should be administered. Four or five ounces of this may be given in a day.

CONSTIPATION.

Constipation is a symptom of disease. It consists of an undue accumulation of fæces, and may be due to too great or rapid absorption of the fluids of the intestinal canal, as seen in febrile disorders. It is a symptom of liver and intestinal disorders. The kind of food may exercise some influence in producing constipation.

Symptoms.—The fæces are passed in hard pellets, and are coated with mucous. Abdominal pain is present. The animal paws and rolls, but not in as violent a manner as in colic. The fæces generally accumulate in the colon, giving rise to impaction of that portion of the bowel, as previously described.

Treatment.—See Impaction of the Colon.

INTESTINAL CONCRETIONS

Are found in the large intestines. They consist of masses of hard material, round in shape, formed of salts of lime and magnesia. If a section be made of the calculus, it will be found to consist of layers arranged around a nucleus, generally consisting of a piece of iron or pebble. They are found most frequently in ani-

mals fed on the sweepings of flour mills. Sometimes calculi of enormous dimensions have been removed by the aid of enemas and the animal recover. Balls, composed of hair, are frequently seen in cows and pigs; in cows, they result from the animal's licking itself.

Symptoms.—There are no diagnostic signs beyond those of violent abdominal pain. We may, however, judge pretty accurately by recurrent attacks of colic, immovable obstruction, etc.

Treatment.—Where a calculus is suspected, an examination must be made per rectum. The arm should be well greased and

Fig. 115—Intussusception.

passed as far as possible into the canal, where it is possible that the calculus may be felt; if found, it should be grasped and removed.

INTESTINAL TUMORS.

Tumors of various sizes are found in the intestines. If large, they obstruct the passage, and death ensues. They are not frequent.

INTUSSUSCEPTION.

By intussusception is meant the slipping of a portion or whole of a bowel into the cavity of another bowel. This is rarely met with, but when it occurs it usually results in death.

Symptoms.—The symptoms are those of enteritis and obstinate constipation.

Treatment of intussusception is by administration of opium, two ounces, to relieve pain.

VOLVULUS, OR TWISTED BOWEL.

This is caused by a portion of the intestine becoming twisted in some way or other. There is no possible way of diagnosing this trouble in the horse. The correct nature of the trouble can never be ascertained except by a post-mortem. The symptoms are those of enteritis and colic.

ASCITES, OR DROPSY OF THE ABDOMEN.

This consists of a collection of fluid in the peritoneal sac of a serous nature. It results from diseases of the liver principally, but may result from other diseases.

Symptoms.—There will be noticed an enlarged condition of the belly, which fluctuates, and gives off a dull sound on percussion.

Treatment.—When the trouble is due to organic disease of the liver, heart, or other organs, a cure cannot be made. The operation of paracentesis abdominis, or tapping, may be resorted to, but generally it only gives temporary relief.

XXXII.

DISEASES OF THE NERVOUS SYSTEM

ENCEPHALITIS.

Encephalitis, or inflammation of the brain, is frequently met with in some localities.

Causes.—It occurs as a result of an injury; in other cases it can be traced to the food or water. It may result from feeding on over-ripe grasses or on roots that have lain in the cellar all winter, or from eating narcotic weeds and plants. The feeding of over-ripe rye grasses in Great Britain frequently produces brain diseases. It may also be due to tumors.

Symptoms.—The first symptom is dullness; the animal falls asleep while standing, and may nod the head. The pulse is slower, the urine is scant; he walks with a staggering gait; looks excited; thrusts his head against the manger and presses it there for some time. He moves the limbs automatically, rears and falls, gets up and may put his feet in the manger, and elevate the head high up into the rack. There are often seen twitchings of the muscles of the neck, the eyes become blood-shot, the breathing stertorous, and sometimes there is frantic effort to climb over the stall. In some cases the animal walks in a circle, and no persuasion or force will induce him to move otherwise.

Treatment.—Give eight drachms of aloes, combined with one drachm of calomel. The cow should be given twenty ounces of sulphate of magnesia and fifteen croton beans. The animal should have plenty of water to drink, and the head should be bathed with cold water, or pounded ice in a bag may be applied to the head. Belladonna in two-drachm doses may be given, and is usually attended with good results. Bromide of potassium, in three-drachm doses, should be given every three hours, along

with the belladonna. When the bowels act freely there is hope of recovery. If the patient is lying down, he should be padded up and his comfort attended to. If cold sweats break out, and the eye becomes amaurotic, death will soon follow. The prognosis of this disease, as a rule, is unfavorable.

SUNSTROKE.

Sunstroke is of very frequent occurrence in large cities, and especially in our large cities of the South. It is a greater or less congestion of the brain, with loss of sensation and voluntary motion.

Causes.—Excessive heat is the important causative agent, but other circumstances co-operate, such as muscular exertion, unduly severe and prolonged. High feeding on highly stimulating food, irregular exercise, an insufficient supply of water, and badly ventilated stables, are predisposing conditions. Debility is also a predisposing cause. The horse is not always attacked while exposed to the direct rays of the sun. The attack may come after he has returned to the stable; generally it takes place when the heat of the day is at its maximum, between noon and 6 P. M.

Symptoms.—Generally, before the trouble becomes well marked—that is, before the acute stages are reached—certain premonitory symptoms are observed, such as an unusual dullness and languor on the part of the animal. As a rule, he does not perspire as he should when put to exertion; there is dryness of the skin, with increased temperature. These premonitory symptoms may be shown for three or four days. In severe cases, the patient usually passes quickly into the comatose state; falls, and when down extends the head. The pupil in some cases is dilated, in some contracted, in some normal, but the respondency to light is lessened or lost. There may be contraction and dilatation at different periods in the same case, an amaurotic stare, and loss of vision. The pulse may be unfrequent at first, as in cases of

apoplexy, but it often becomes frequent and feeble toward the fatal termination. The respirations are sometimes stertorous, in other cases suspirous, and accompanied by sighing or moaning. In most cases the temperature of the body is notably raised. If the breathing be stertorous, with deep coma, sighing or grunting, the prognosis is extremely unfavorable. Great feebleness,

Fig. 116—Icing in Sunstroke—the horse in a comatose state.

relaxation of the sphincters, tracheal rales, and complete immobility, are forerunners of a fatal termination; convulsions are extremely unfavorable.

Treatment.—If the patient emerges from the comatose state, convalescence is usually speedy. The treatment is to be adapted to the pathological character of the affection, as represented by the symptoms in individual cases. Pursuing this course, therapeutical measures, so far from being the same, will be diametrically opposite in different cases. In cases of nervous exhaustion,

there is danger of death from asthenia or syncope. Complete rest is of the first importance. Alcoholic stimulants, in ounce doses, should be given, if there be power of swallowing. If the power of swallowing is gone, alcoholic stimulants should be given by enema. Pounded ice, in a sack, should be applied to the head. In some cases the body should be kept warm. The patient should be placed in an atmosphere as comfortable, cool

Fig. 117—The horse conscious, assisted to his feet preparatory to moving to the hospital.

and pure as possible. If the animal is lying exposed to the rays of the sun, an awning should be erected over him. Rub the extremities and body vigorously, and use hot applications on the extremities. If the surface be hot and dry, the body should be sponged with spirits and water or rubbed with ice and sprayed with ice water; but this should not be kept up after the rectal temperature has fallen below 104 or 105° F. If the treatment is kept up after the temperature has fallen below 104° F., the fall is apt to be too rapid and great. The hypodermic injection

of ether is highly recommended by Prof. Smith, and I have used it with good results. If the animal shows signs of returning consciousness, there is hope of recovery; if he wishes to drink give him pure cold water. If he recovers sufficiently to get on his feet, he will go struggling along from side to side when he attempts to walk, and it may be necessary to place him in slings. Give a small dose of purgative medicine. Cold application to the head is important in proportion as the cerebral congestion

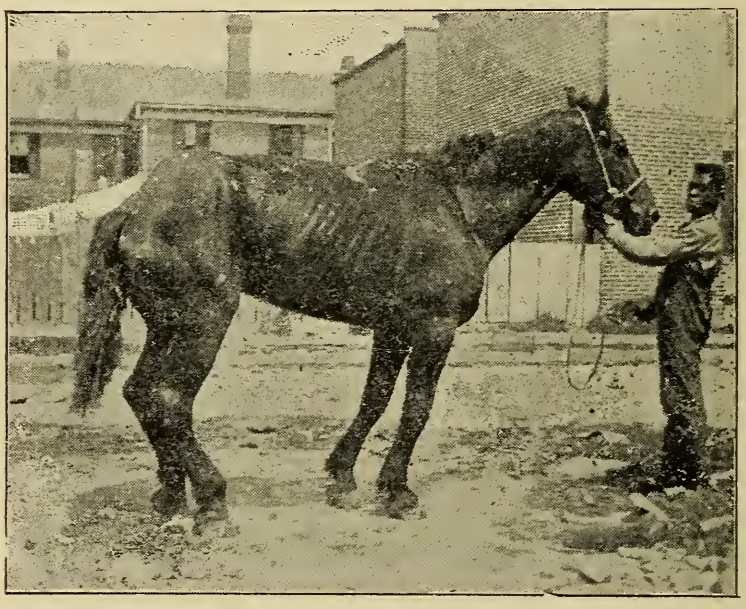


Fig. 118—Result of a case of Sunstroke suffering too long before receiving treatment.

predominates. When the circulation is feeble stimulants are needed. If the animal is found lying in a comatose state, it should be treated on the spot. There are reasons to believe that many cases which terminate fatally would otherwise have ended in recovery but for the necessity of moving the animals to stables or infirmaries and delay in obtaining medical aid. Bromide of potassium may be given. The horse should be kept in position on the sternum by sacks of straw wedged under the shoulder. All air possible should be given, and curiosity seekers should not be allowed to obstruct its passage.

CONCUSSION OF THE BRAIN.

Concussion of the brain is usually caused by the horse running away and striking his head against some hard object, or rearing and falling backwards and fracturing the basilar process of the occipital bone. Concussion is due to an injury on the head in various ways.

Symptoms.—In concussion of the brain, complete loss of motor power and sensibility takes place. The pupil of the eye

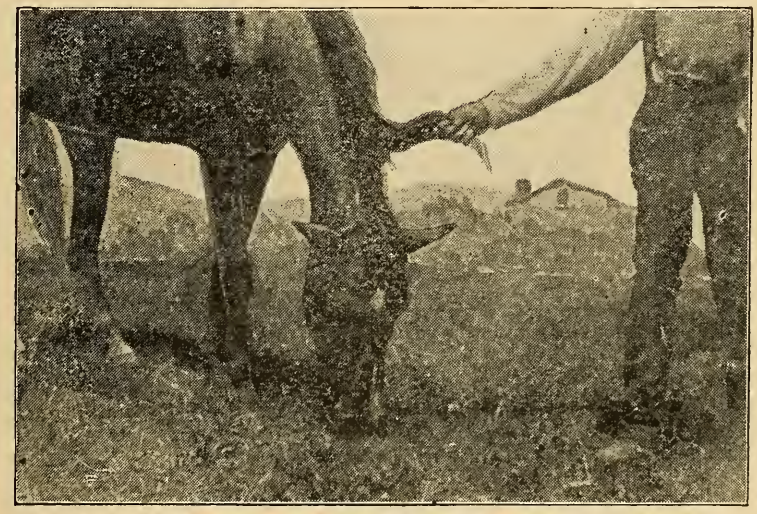


Fig. 119—Concussion of the Brain. Showing mechanical congestion from hanging the head to the extent of rendering the animal unable to lift the enlarged head.

is dilated, the pulse indistinct; the temperature of the body lower than in health; the breathing is stertorous, and the animal totally unconscious. In a few hours consciousness may return, when he will make an effort to rise, getting up with his forelegs under him like a cow, hind legs first. If the pulse is strong, recovery may be expected.

Treatment.—Apply cold applications to the head and warm applications to the body and extremities. Prop the patient up on his sternum, or sling him. Give stimulants and enemas. Sometimes the patient will hang its head persistently until me-

chanical congestion of the lips take place. They should be scarified and bathed, and the head elevated by means of a sling.

EPILEPSY.

This disease is seldom seen in the horse, but frequently in the dog. It is characterized by complete loss of consciousness for a short time, with spasmodic contraction of the muscles. In young dogs epileptic fits are associated with dentition and worms in the intestinal canal or stomach.

Symptoms.—The animal in apparent health is seen to stagger and stare, then fall in a convulsive fit and froth at the mouth. The attack lasts three or four minutes, after which he gets up, walks about in a dull manner, but soon recovers.

Treatment.—In treating this affection the bromide of potash, in half-ounce doses, should be given. A purgative should be administered, as six drachms of aloes. If teething is the cause, the offending teeth should be extracted. If due to worms in the stomach or intestines a vermifuge should be given. The condition will be dealt with more fully in the chapter on dogs.

VERTIGO.

This condition is due to some lesion of the brain. It may be due to temporary congestion, to cerebral tumors, or anything that interferes with the flow of blood to or from the brain. Gastric derangement will cause it. Over-study causes the condition in man.

Symptoms.—The animal usually stops while being driven, elevates the head, staggers and falls, lies thus awhile, and in a short time gets up, shakes himself, and appears to be all right.

Treatment.—Give six drachms of aloes, and follow with half-ounce doses of the bromide of potash every four hours. Some animals subject to this trouble are extremely dangerous.

APOPLEXY.

"Apoplexy is a disease characterized by sudden loss, more or less complete, of volition, perception, sensation, and motion, depending on sudden pressure upon the brain (the tissues of which may be morbid), originating within the cranium." *(Aitkin.)*

It is due to arrest of the circulation of the blood in the brain, and there may possibly be rupture of some of the small blood vessels of the part and extravasation of blood. It is seen in all animals.

Symptoms.—There may be some premonitory symptoms, such as staggering and partial paralysis. Soon the animal will fall and lie in an unconscious condition, without the power of motion. The eyes are wide open, presenting a ghastly stare. The breathing is stertorous, the body cold, the pulse small. In some cases the animal retains the power of muscular movements, and fights convulsively. These symptoms may alternate with quietude.

Treatment.—Give several doses of the hyposulphite of soda, half-ounce doses, every four hours. Apply ice to the head, and bleeding may be beneficial. Bromide of potash in half-ounce doses should be given.

Apoplexy affecting the cow will be given in chapter on diseases of the ox.

TETANUS, OR LOCKJAW.

Tetanus is a common disease in certain localities. There are some parts of the United States where tetanus is almost unknown, but in other localities it is frequently seen at all times of the year. It is seen mostly during the months of August and September, and frequently takes an epizootic form. The disease is characterized by tonic contraction of the voluntary muscles. The variety known as trismus, or lockjaw, is characterized by contraction of the muscles of the jaws. There are several varieties of tetanus, known as opisthotonos, to designate the variety wherein the muscles of the back are rigidly contracted; empros-

thotonos, when the muscles of the belly are rigidly contracted; pleurosthotonos, when the head and neck are pulled around to one side. Either of the three varieties is seldom seen. I think that I can safely say that in as many as two hundred cases I have never yet seen either of the varieties mentioned in a pure case of tetanus. There are two forms of tetanus—traumatic and iodiopathic. It is traumatic when due to an injury. When the disease occurs without appreciable cause, it is known as iodiopathic tetanus. Tetanus is most likely to occur as a result of punctural wounds, and manifests itself about the time the wound is healing, or the ninth or tenth day after the injury. It follows castration, and is one of the most fatal diseases of the horse.

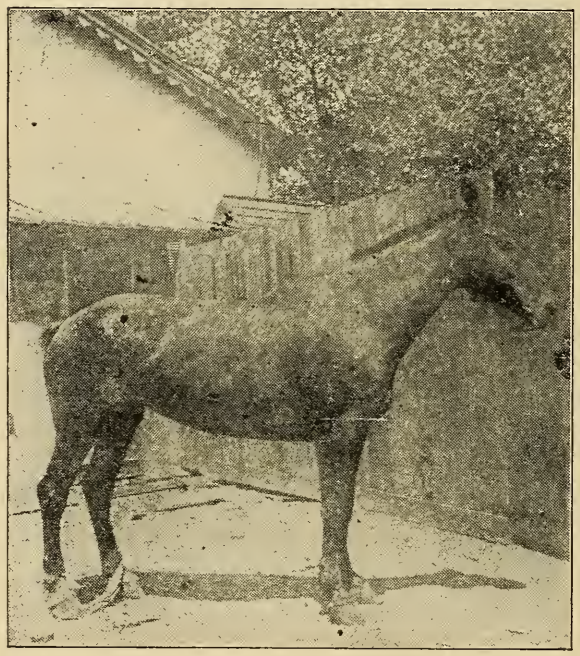


Fig. 120—Lockjaw—First Stages.

Symptoms.—The condition is easily diagnosed when the disease is well developed. When once seen it will never be forgotten. The driver usually finds that the horse drives duller than usual, shows some excitement on being harnessed, walks with the hind limbs farther apart than usual. He pokes his nose out farther than natural, and travels in a peculiarly stiff manner. These symptoms may be shown for a day or two, when the advanced symptoms of tetanus are seen. The animal stands with legs apart; in other words, props himself with his limbs, similar to a wooden horse. The excitement is greater, the spasms are well marked, and come on more frequently. The head is poked out

and the jaws closed. The membrana nictitans, on lifting the head, extends almost over the eyeball. The tail is drawn up, the animal carrying it stiffly. The ears are stiff, and stick straight up; and the nostrils become peculiarly dilated. The pulse varies according to the excitement. The bowels are usually constipated, the urine scant. If the animal lies down, his limbs stand out, stiff as four sticks. If the case is far advanced, he cannot

Fig. 121—Lockjaw. A well developed case.

get on his feet again. When the symptoms are greatly aggravated, the animal fights and struggles, the body becomes bathed with sweat; if the animal is not raised in five or six hours, he dies from exhaustion.

Treatment.—Quietude is of the greatest importance. The animal should be placed in a darkened, out of the way place. No persons except the one to administer medicine or the doctor should be admitted, and even they should only go to him three times a day.

Every drug in the pharmacopœia has been tried. Experience

with me has confined this number to four or five drugs. Administer eight drachms of aloes, and follow with one-ounce doses of powdered belladonna leaves in a bolus, or one drachm of the tincture may be used. Place the medicine well back on the tongue, and it will be sucked in. Atropine may be given hypodermically in five to ten minim doses. Bromide of potash should be dissolved in the drinking water, if the power of swallowing is not lost. If this treatment does not seem to do well, one drachm of powdered opium, made into a pill, should be given, or morphine may be given hypodermically in five-grain doses. I have had good results from the use of calabar bean in thirty-grain doses. The food should be of the best and most nutritious quality, given in a thin gruel. The various liquid foods should be given. If the disease runs an acute course, ending in about three days, a cure cannot be made. When in the acute form the spasms come on every ten or fifteen minutes from the first of the attack, and gradually increase. If this occurs twelve hours after treatment has been employed, the disease will result in death in three or four days. If it runs a chronic course, and the animal lives over the tenth day, a recovery may be expected. The animal will not fully recover under six weeks or two months. He should receive exercise during convalescence, and should do only light and slow work for two months.

CEREBRAL TUMORS.

Tumors are often found in the choroid plexus. They grow very slowly and scarcely ever affect the health of the animal. If they become as large as a pigeon's or hen's egg, they will give rise to severe convulsive fits. Nothing can be done for this trouble. Tubercular meningitis is seen in animals of a tubercular diathesis. The symptoms are those of cerebral disturbance. There is a thickening of the dura mater, atrophy and a hypertrophied condition of the brain, tumors in connection with and softening of the brain. They all occur as a result of many other

diseases, and the symptoms are not well marked, being those usually presented by cerebral disturbances.

HYSTERIA.

Hysteria is characterized by a highly nervous or excitable condition. It is seen in all female animals. It is caused by some change or excitement of the generative system.

Symptoms.—The animal becomes excited to a great degree. The pulse runs away, the mare neighs continually, and in some

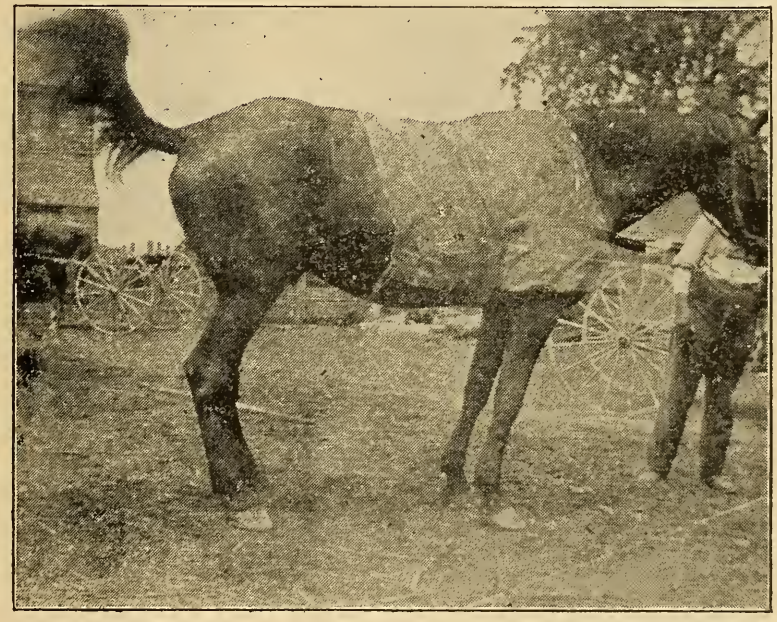


Fig. 122—Hysteria.

cases there is a kind of hiccough, caused by spasms. There is usually a whitish or reddish colored discharge from the vulva. Hysteria usually occurs about the time the animal comes in heat; but it may, though rarely, occur in pregnant animals. The symptoms will subside in a few days. The appetite is impaired, and sometimes there is present urination.

Treatment is not necessary. Opium, in ounce doses, or bromide of potassium, in half-ounce doses, may be used.

CHOREA.

Chorea is a disease of the nervous system, characterized by involuntary and convulsive muscular movements. It is frequently seen in the dog. See Diseases of the Dog.

A form of chorea, known as stringhalt, in the horse is frequently met with, and is characterized by a violent spasmodic jerking of one or both hind legs. It is seen more particularly

Fig. 123—Stringhalt.

when the animal first comes from the stable and during cold weather. It is due to some lesion of the nervous system.

Symptoms.—To detect the disease when slight, he should be made to walk forward, and turn to first one side and then the other. While doing this the animal should be excited by using the whip. Walk him forward, trot him, and excite him with the whip. Some horses only show it in the stable by being made to

step from side to side. Some will trot along for eight or ten steps, and then jerk up the foot.

The disease is incurable, and is not worth while treating.

SHIVERING.

Shivering is a form of chorea, and is due to some lesion of the nervous system, perhaps the spinal cord. It affects the posterior parts principally.

Symptoms.—It is seen most when the animal is backing or endeavoring to back. He has great difficulty in backing, and becomes excited. There is muscular twitching, with elevations and quivering of the tail.

Treatment.—It is useless to treat. Nerve tonics and sedatives may benefit it for a little while, as nux vomica, in drachm doses, and bromide of potash, in two-drachm doses, twice a day.

IMMOBILITY.

This is also a form of chorea, and is characterized by excitement. The animal when excited loses all use of his limbs; there is quivering, and he will finally sit down on his haunches. Nothing can be done in the way of treatment.

SPINITIS.

Inflammation of the spinal cord and its coverings occurs in the acute and chronic forms. It may result from injuries or struggling when confined for operation. Certain grasses and bad food also cause the disease. It is likely to terminate in paralysis, which may be due to softening of the cord.

Symptoms.—The symptoms in the acute form are as follows: The animal while at work will suddenly perspire profusely; the breathing becomes quickened, and there will be great restlessness. The hind feet are lifted from the ground in a violent manner. The animal may fall, struggle violently, and finally get on his feet again. His pulse runs up to ninety, the mucous membranes are injected, and the body bedewed with sweat. There

may be intervals of quietude, and then a dreadful agony. This may exist for some hours, when the spasms may be relieved. He may get on his feet, stagger and knuckle over at the fetlock, and appear to be improving wonderfully, when sudden relapse may come, bringing paralysis and death.

In the chronic form the symptoms are a stiffness of the spine, the animal turns with difficulty, the limbs are flexed with difficulty, the nose is elevated. In a few weeks the hind legs become feeble, the animal knuckles over at the fetlock, crosses his feet, staggers, and eventually becomes paralyzed.

Treatment.—Give eight drachms of aloes, combined with two drachms of belladonna. Stimulants should be applied to the spine. Ergot of rye, in combination with the iodide of potassium, may be used, three drachms of each three times a day. The bladder must be emptied, and the catheter should be used at least three times a day. Enemas should be regularly administered, and the bed kept clean and dry.

PARALYSIS.

Loss of voluntary motion, either with or without loss of sensation. It may be seen in various forms rather as a symptom of a lesion than as a disease itself. It is divided into hemiplegia and paraplegia. It may be described as local; that is, where paralysis of several muscles occur.

Hemiplegia is that form of paralysis in which one lateral half of the body is affected. It is very rarely seen in the lower animals, and results from some disease or injury of the brain.

Symptoms.—When down the animal cannot rise, motor power, and sometimes sensation of one-half of the body, being lost. The ear on the affected side becomes pendulous. The cheek hangs down, the angle of the mouth is lower, and the nose may be turned towards the side affected.

Treatment.—If the animal can support any portion of its weight, it may be put in slings. Eight drachms of aloes should

be administered, followed by coarse powdered nux vomica, in one-drachm doses.

PARAPLEGIA.

This form of paralysis is frequently seen in the lower animals. It is produced in a variety of ways, as slipping, falling, and jumping. It may originate in indigestion and constipation. Paralysis arising from indigestion is occasionally seen during an attack of colic. It is sometimes seen in the mare during the period of œstrum. In horned cattle, paraplegia is not an unfrequent symptom of indigestion, arising from impaction of the rumen, and from uterine irritation. If the paralysis is due to fracture of the anterior dorsal vertebra, there will be loss of motion in the anterior as well as the posterior extremities. When the posterior extremities only are paralyzed, the practitioner may know that the injury is situated pretty well back.

Treatment.—Give eight drachms of aloes. Ergot of rye and belladonna may be used, one drachm of each. The bromide of potash should be given in the early stages, followed by nux vomica, in drachm doses. Sling may be used if he will support part of his weight by his limbs.

HYDROCEPHALUS.

This is the term given to water in the cranial cavity. It is sometimes seen in connection with a fetus; in such a case, delivery cannot be effected unless an opening is made in the head of the fetus and the fluid allowed to escape.

XXXIII.

DISEASES OF THE LIVER.

The horse does not suffer from liver trouble to the extent of the human being, although the same conditions prevail in the horse as in the human being. The cause of liver disease is feeding an animal on a highly stimulating diet for a long time. Congestion of the liver occurs as a symptom of other diseases, as disease of the heart and lungs.

Symptoms.—Abdominal pain, the animal looking to the right side; yellowness of the mucous membrane; high, brownish color of the urine; constipation of the bowels; the fæces are sometimes of a light clay color and fetid, a sour, acid or offensive condition of the mouth; grinding of the teeth. In some instances pain is manifested by lameness in the off (right) shoulder.

Treatment.—Give eight drachms of aloes. The food should be of a character easily digested. Sulphate of magnesia may be given night and morning, in one-ounce doses, diluted in a half pint of water. A course of iodide of potassium is useful.

HEPATITUS, OR INFLAMMATION OF THE LIVER.

This disease, very rare in the lower animals, may be produced by feeding on coarse, inferior food. It is almost always connected with inflammation of the other abdominal organs. After death the liver is found to be congested, of a grayish-red color, and weighing from forty to fifty pounds. An epizootic form of the disease has occurred in Italy.

Symptoms.—The animal is dull, the coat is staring, the pulse quick and weak, and the fæces of a clay color. There is a strong manifestation of fever rising in the system. The animal may lie down and roll, but not in as violent a manner as a case of colic. On the second or third day the mucous membranes begin

to turn yellow. The inner surface of the lips, cheeks and tongue, the conjunctiva, and in some cases the transparent cornea and iris as well, become yellow, manifesting the diffusion of bile over the body. The fæces even are of a yellowish tinge. The urine is thick and contains the same bilious tinge. The horse will lie down, look at its right side, and soon get up again. If

Fig. 124—Inflammation of the Liver.

the right side be pressed upon the animal will flinch. Lameness in the off shoulder has been observed.

Treatment.—Give eight drachms of aloes, and follow with twenty drops of the tincture of aconite, given every two hours. Ipecacuanha is of value in the treatment of this disease. Calomel and other liver stimulants should not be given. Counter-irritation, as mustard over the region of the liver, is of great service. Potassium iodide, in one-drachm dose should be given three times a day. The food should be of the best quality. Scalded bran should be given the first few days, then give grass or some nutritious diet.

The disease frequently occurs in the chronic form, giving rise

to changes in the substance of the liver, whereby it either becomes enlarged and softened in structure or hardened and diminished in bulk.

JAUNDICE.

Jaundice, or yellows, is a symptom of many affections in which the tissues of the body are dyed yellow. It is, however, very generally spoken of and regarded as a disease of itself. The principal symptom is yellowness of the skin. Any disease of the liver may give rise to this jaundice appearance, as over-stimulation of the gland by feeding largely and giving but little exercise. Suppression or non-secretion of bile in consequence of inflammation, or functional inactivity of the gland itself, or the presence of any obstruction preventing the passage of bile through the ducts, may result in reabsorption of the coloring matter, which, entering the blood, is carried to all parts of the body. There is a test by means of which one can ascertain whether the conditions are caused by obstruction of the ducts or due to functional inactivity of the gland. Harley's test is as follows: Take of acid sulphuric one drachm, loaf sugar a sufficient quantity, add two drachms of the suspected urine to the sugar, then add the sulphuric acid slowly. If the trouble is due to obstruction, the mixture will become a scarlet or purple red at the line of contact; but if a brown color be present at the line of contact, proof conclusive is obtained that the trouble is due to suppression. The test is thoroughly reliable.

Treatment.—If the test reveals functional inactivity of the liver, eight drachms of aloes, with two drachms of calomel, may be administered. In case it indicates obstruction, liver stimulants would do harm.

SCIRRHOSIS.

Scirrhosis, or induration of the liver, may result from hepatitis, but it frequently occurs from feeding on damaged food, such as damaged and mouldy hay, or changing from a poor food

to a highly stimulating diet. In man the same condition exists where long continued alcoholic stimulants are used.

Symptoms.—The symptoms are those of general liver disease, the animal gradually falling off in condition. The yellow tinge of the skin is also present. The fæces are clay colored and very fetid. The animal, as a rule, persistently stands. The disease is a little difficult to diagnose from other liver troubles.

Treatment.—Sulphate of magnesia, in ounce doses, should be given for several days. Bicarbonate of soda may be given in three-drachm doses. The animal should be put on a long course of tonics.

RUPTURE OF THE LIVER.

Rupture of the liver takes place in the horse, but it is very difficult to diagnose. The treatment would be the administration of styptics, as tincture of iron, in two or three drachm doses, or half-ounce doses of ergot.

BILIARY CALCULI.

Biliary calculi are very rarely found in the lower animals, and there are no symptoms showing their presence during life. They are only revealed by a post-mortem.

Other conditions of the liver occur, as atrophy, wasting of the gland, or hypertrophy, or an abnormal enlargement of the liver. Abscesses and tumors of various kinds may occur in connection with the liver, and give rise to no well-marked symptoms peculiar to themselves. The treatment of any of these conditions is useless. Good food and use of tonics is all that can be done.

XXXIV.

DISEASES OF THE SPLEEN AND PANCREAS.

Diseases of the spleen are revealed on post-mortem; but there are no symptoms during life which indicate their presence. There are various organic changes taking place in connection with the pancreas, as atrophy, hypertrophy, thrombosis, tubercle, the presence of hydrates, lymphadenoma.

Numerous symptoms have been enumerated for the various conditions, but I question whether they can be diagnosed correctly.

XXXV.

DISEASES OF THE KIDNEYS.

The kidneys of the lower animals are in a great measure exempt from diseases which so often destroy human life. They do not indulge in alcoholic drinks, and are free to a certain extent of the cares and troubles of the world. Their emotions and mental anxieties are not so great. Diseases of the kidneys, however, do occur and are well marked. Physiologically the kidneys excrete from the body those materials resulting from metamorphosis of tissue, which, if retained, would act injuriously upon the system generally.

INFLAMMATION OF THE KIDNEYS—NEPHRITIS.

This disease is seldom seen in the lower animals. When it does occur it is generaly found in the chronic form. Nephritis generally embraces all the structure of the kidney, often commencing in the mucous membrane of the uriniferous tubes, and afterward involving the parenchyma. One kidney may be affected to the exclusion of the other.

Causes.—Many injuries and strains, causing a stiffness in the animal's gait, have been mistaken for kidney trouble, and we meet with practitioners who blister a poor animal's back and loins in most cruel manner. They come to the conclusion that bowel diseases and most injuries are pure cases of kidney disease. They seem to have made up their minds before seeing it that the animal had kidney trouble, and diagnosed as kidney trouble what was simply a strain, or stiffness from over-exertion. I think the most prolific cause is due to the absorption of irritable medicines applied as local liniments, or it may be produced by the administration of internal medicines which have an irritating effect, as croton oil, turpentine, etc. Long-continued effect of cold, as

cold water dropping upon the animal's back, or exposure of the animal to cold after severe exertion, may produce it.

Symptoms.—There is considerable fever and colicky pains. The pulse is hard and frequent, with increased thirst; short, rapid breathing; hot, clammy mouth, and constipation of the bowels. The most important diagnostic symptom is the scanty secretion, or total suppression, of urine, with desire to micturate

Fig. 125—Inflammation of the Kidney—Acute.

frequently. The animal stretches itself in vain attempts, passing, perhaps, but a few drops of a highly colored and irritating secretion. When fever with colicky pains is present, in addition to emptiness of the urinary bladder, frequent attempts to urinate, with but little discharge, the examiner may be assured nephritis is present. A stiffness of the loins may be an indication of nephritis, but it is not to be relied upon. Uræmic poisoning may set in, causing the animal to act as though intoxicated, and a strong uriniferous odor is given out in the perspiration.

Treatment.—Give a pint of linseed oil or eight drachms of aloes. Warm fomentations, succeeded by mild mustard applications, should be used over the loins. One to two drachms of the tartar of antimony may be given. If the suppression continues for several days, or if at any time the uræmic intoxication is apparent, the secretion of urine must be excited. To do this digitalis, in the form of a decoction, should be repeatedly applied to the skin. It must be discontinued as soon as the kidneys have

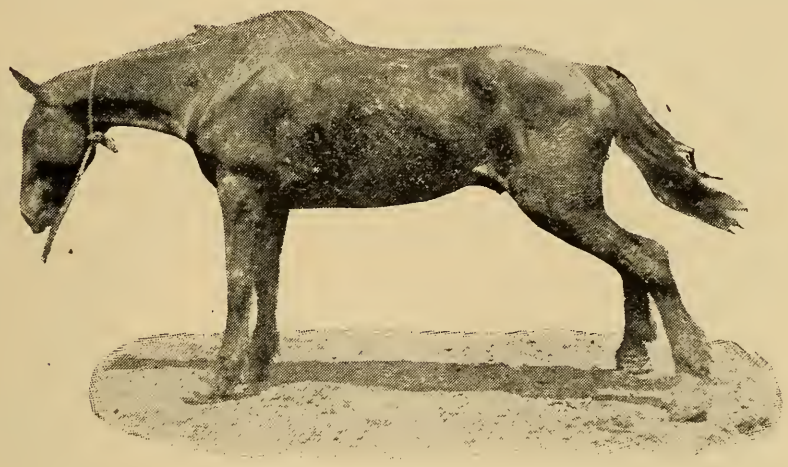


Fig. 126—Inflammation of the Kidney—Chronic Form.

commenced to act. It may be applied in poultices over the region of the kidneys. The results of nephritis are atrophy, hypertrophy, etc.

HYPERTROPHY.

This is an abnormal enlargement of one or both kidneys. The condition may exist for some time without presenting any sign of disease. The condition may be easily detected by placing the hand well up in the rectum. A case is on record in which the kidney weighed fifty pounds, and Percival mentions a case in which the kidney weighed upwards of one hundred and twelve.

Treatment.—Such cases cannot be benefited very much, still the carbonate of soda may be tried, in two-drachm doses three times a day.

ATROPHY OF THE KIDNEY.

Atrophy of the kidney may be treated by putting the animal on a course of nux vomica and by giving alcoholic stimulants.

Melanotic deposits occur in connection with the liver, and are always seen in connection with gray horses. The symptoms are those of kidney troubles. The diagnosis may be assisted from the fact that it usually occurs in gray horses, and when melanotic tumors are seen in other parts of the body. It is not worth while to treat this condition.

FLOATING KIDNEYS.

One or both kidneys may be displaced; and cases are on record where one kidney has been removed, the operation causing little or no inconvenience.

ALBUMENURIA.

The occurrence of large quantities of albumen in the urine is a consequence of acute nephritis, or more frequently it occurs from some irregularity of the diet, faulty diet giving rise to derangement of the nervous system. This condition is identical with the disease known as Brights disease in the human family.

Symptoms.—The animal, as a rule, persistently stands, and there may be stiffness in the gait and shortness of breath. The animal may be more or less dull, loses flesh, and presents an unthrifty condition generally. There will be odematous swellings in the limbs. The animal will stand stretched out in his stall, with his forefeet under the manger and his hind feet backward. He will stand in that position all day long, and it seems comfortable to him. He usually comes out of the stable with a stiff motion. Where the above symptoms are present, it may be stated pretty accurately that albumen exists. To be sure that the diagnosis is correct, the test for albumen should be made as follows. To a small quantity of the suspected urine, add a little

nitric acid, and heat the mixture, when coagulation of the albumen contained in the urine will at once take place.

Treatment.—The bowels should be kept in a relaxed condition by giving small doses of aloes. When constipation arises, eleterium may be used with success in fifteen minim doses. The food should be of the best quality, and the body should be kept

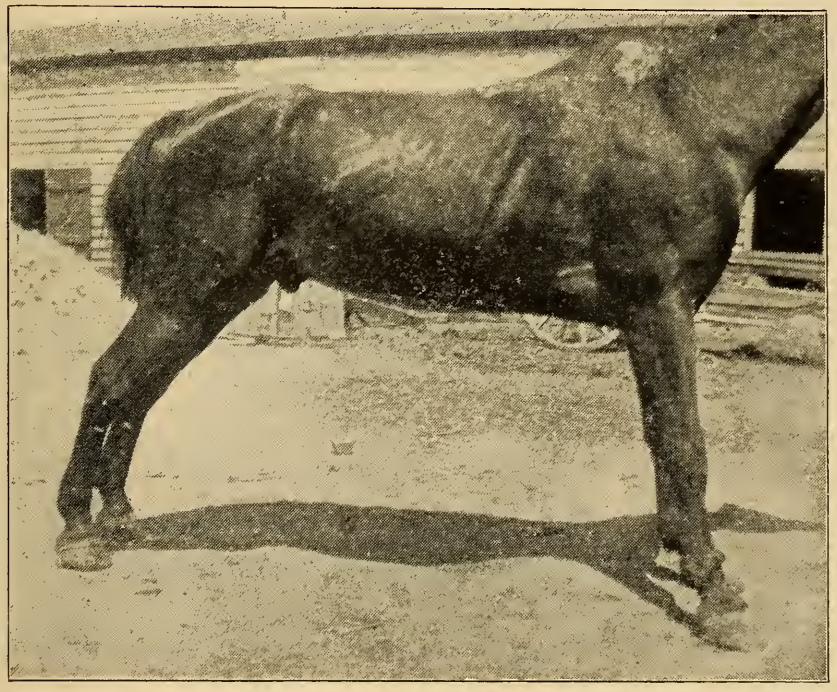


Fig. 127—Albumenuria.

warm. If convalescence is established, tonics should be administered, as sulphate of iron, three drachms; gentian, two drachms, may be given in the feed night and morning.

POLYUREA, OR DIABETES INSIPIDIES.

This is a dietetic disease, due to a deranged condition of the digestive system, which, causing an alteration in the condition of the blood, gives rise to excessive secretions of a clear, colorless urine.

Causes.—It is caused by faulty dieting, or the use of putrid, stagnant waters. The use of mouldy hay or corn is no doubt the

most usual cause. It may occur as the result of some debilitating disease.

Symptoms.—The animal becomes very dull. The coat is dry and dusty-looking, the animal falling off in flesh to a considerable extent. The appetite is capricious, one day eating heartily and the next day refusing all food. The pulse becomes weak, and there is a terrible thirst; if led to the water, he will drink all that he possibly can, and there will be a difficulty in getting him away. The animal perspires freely on the slightest exertion. He rapidly loses flesh, and will soon die if nothing be done for him.

Treatment.—Discover the cause, and remove it. Change the food and drink. Give iodine, one drachm; potassium iodide, one drachm, night and morning, in severe cases; and give in addition to this, in the feed, Gentian pow'd, drachms three; iron sulphate, drachms three, twice a day.

RENAL CALCULI.

Renal calculi are found in the kidneys, and are composed of the carbonate of lime and magnesia. Their presence is discovered by the condition of the urine, which is discharged with earthy materials, intermingled with blood. There are occasional colicky pains.

Treatment.—Give hydrochloric acid to dissolve the calculus. One-half drachm should be given diluted in a pint of water twice a day for several days.

SUPPRESSION OF URINE.

This is due to functional inactivity of the kidney. It is characterized by dullness of the animal and passing of urine in small quantities. The urine is normal in appearance. If an examination be made per rectum, the bladder is found to be empty, or nearly so.

Treatment.—All that is required is simply the administration of a stimulant, as an ounce of sweet spirits of nitre with a half

ounce of nitrate of potash; or rosin may be used. Three or four doses may be necessary.

CYSTITIS, OR INFLAMMATION OF THE BLADDER.

This disease occurs in all animals, and, I think, is due solely to the administration of irritable medicines. It may be caused by the absorption of irritating blisters, applied externally.

Symptoms.—There will be pain, with a difficult passage of urine; the pulse is quickened, the mouth is hot. The horse may

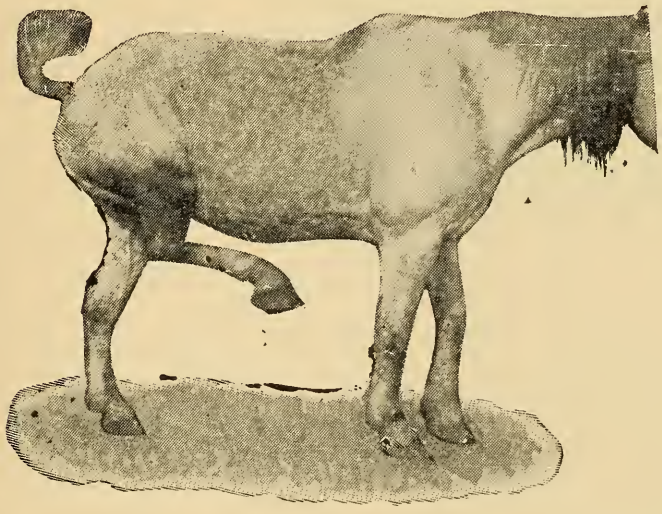


Fig. 128—Inflammation of the Bladder.

stamp and lie down. An examination per rectum will reveal heat, and give rise to pain.

Treatment.—Twenty drops of the tincture of aconite and three-drachm doses of nitrate of potash should be given. If the patient is a female, tepid water, with a little tincture of opium added, should be injected into the bladder. Enemas of warm water should be given per rectum. Clothe the animal well, and keep the bowels open by the use of oil.

RETENTION OF URINE.

An inability, total or partial, to expel by natural effort the urine contained in the bladder. Its escape is prevented by mus-

cular contractions of the neck of the bladder, by enlargement of the prostate gland, prolapse of the rectum, dirt in the sheath, or cancer of the penis.

Symptoms.—Frequent and ineffectual attempts to urinate. The animal will stretch himself out, strain violently, and groan. He may succeed in voiding a very small quantity of urine, which comes away in a short, forcible jet. An examination per rectum will find the bladder full of urine.

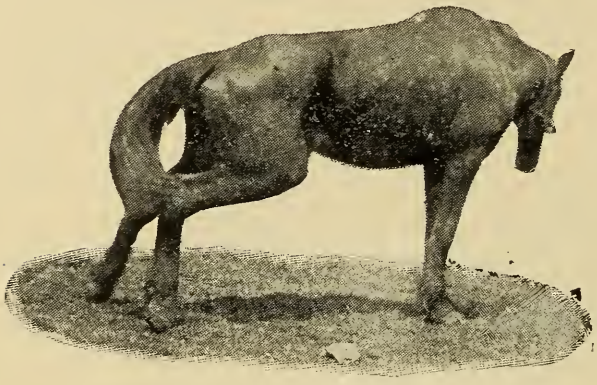


Fig. 129—Retention of the Urine.

Treatment.

The arm should be well lubricated and gently passed into the rectum until the bladedr is reached. Gentle pressure should be brought to bear upon it and its contents forced out. Should this fail to remove the urine, a warm-water enema, especially an enema made from the decoction of tobacco, should be used; after which pressure may again be employed to the bladder. If this fail the catheter must be passed and the urine withdrawn.

MELANOTIC DEPOSITS IN THE BLADDER.

These are deposits seen in bladders of gray horses. Tumors and fungoid growths are also found in the bladder.

Symptoms.—A difficulty in voiding the urine; the urine is tinged with blood, owing to rupture of small blood vessels. At times the urine may be black. The animal falls off in condition. The tumor may be detected by an examination per rectum.

Treatment.—Not much can be done for these conditions. If a fungoid growth is present, its removal may be tried. The operation should not be tried unless it be the only means of preventing death.

INVERSION OF THE BLADDER.

This frequently occurs in the cow and mare, and usually follows difficult parturition, but may result from debility. It is detected by a small and reddened tumor-like substance protruding from the vulva. The urine escapes dribbling down over the thighs.

Treatment.—Bathe the bladder with warm water and tincture of opium, and return it to its place as soon as possible. The vagina may afterwards be injected with warm water. The hind quarters should be elevated, and opium tincture may be given by the mouth in ounce doses. If the case has been neglected and the bladder becomes gangrenous, it should be removed by the ecraseur. The urine will then escape through the ureters and run over the thigh.

CYSTIC CALCULI.

Cystic calculi are said to originate in the limestone districts. I have always doubted whether the water from limestone districts would cause calculi. I am now convinced of the fact that calculi are more frequent in limestone districts. I have made observations regarding this in my practice in the limestone belts of the North, and in the low, sandy, cotton belts of the South. A very minute portion of foreign matter may be present in the bladder and act as a nucleus around which the calcarious material is deposited.

Symptoms.—A single calculus or numbers may exist in the bladder at one time. The urine becomes white or milky in color, and when being voided, instead of a full, round stream, the flow may be suddenly checked by the presence of the calculi. The animal will stand in the position for urinating, and after several attempts may succeed in voiding it. The urine may dribble away at times and be tinged with blood. To make certain of the condition, all that is required is an examination per rectum, when the calculi may be felt.

Treatment.—If the patient oe in a limestone country, change the water and give rain water. The animal should be given plenty of salt and be put on a course of hydrochloric acid; drachm doses should be used twice a day for a week.

In case the calculi are large the operation of lithotomy may be performed. This operation is somewhat difficult in the male, but may be easily performed in the female. This should be entrusted to the surgeon.

URETHRAL CALCULI.

These differ from cystic calculi only in their situation. When the calculi pass out of the bladder into the urethra they are known as urethral calculi. Cattle troubled with urinary calculi generally have calcarious deposits on the hair around the prepuce. They may set up an inflammation of the urethra of the ox and cause stricture. In such a case, as the catheter cannot be passed, the only remedy is to cut into the urethra and divide the stricture. This operation in cattle is performed with difficulty. The calculi can be removed from mares and cows with ease. This may be done by lubricating a forceps, passing it in the meatus urinarius and urethra, getting a hold on the calculus and removing it. Injections in the bladder may remove them, or a small spoon may be used.

HAEMATURIA, OR BLOODY URINE.

This is frequently a symptom of calculi. A sprain across the loins, causing rupture of some of the blood vessels, may give rise to hæmaturia. The cause of the hemorrhage should be ascertained. If found to be due to calculi, treat as for calculi. If the hemorrhage is from the kidneys, plumbi acetas, grains twenty, in combination with three or four drachms of the tincture of the chloride of iron may be used.

PARALYSIS OF THE BLADDER.

This condition may be caused by the urine not being passed freely, the bladder not emptying itself during the passage. The

bladder being thus continually distended with urine, becomes enlarged, resulting in paralysis. The symptoms are those of suppression and retention, and can only be correctly diagnosed by an examination per rectum. The bladder may be injected with warm water, and the animal be put on a course of nerve stimulants. Nux vomica, in drachm doses, may be given. The condition is incurable, however, if of long standing.

AZOTURIA.

Azoturia belongs to the class of dietetic diseases, and consists of a hyper-nitrogenous condition of the blood and system, generally due to overfeeding and want of exercise.

Causes.—There is no doubt that a super-abundance of albumen is contained in the blood, and that by increased exercise the albumen is formed with urea and hippuric acid. The blood being overloaded, throws a great tax on the kidneys in excreting the deleterious substances. Wherever the disease is met with, the history of the case reveals that the horse, after working regularly, was rested for several days or a week, then hooked up and started on the road. The animal is said to have driven freely and more spirited than usual. After going three or four miles he was seized on the road. I have never seen a case that was not produced in this manner. The disease exists more frequently in some localities than others. It is seldom seen in the low lands and cotton belts of the southeastern portion of the United States. In the mountainous section it is of frequent occurrence. It seems that the climate or

Fig. 130—Standing in Azoturia.

soil has something to do with it. Albumen is found in the urine in excessive quantities.

Symptoms.—The horse when brought out of the stable, after resting for several days, is in a spirited condition and full of life. After travelling a short distance he becomes somewhat dull and sluggish, perspires freely, and shows stiffness in the loins. In a few minutes he will drag the limbs along. The loss of motor power now becomes well marked in the hind extremities. The animal stops, is unable to go any further, and may fall down. When down, he is unable to rise. The pulse quickens and more or less pain is manifested. He may roll, as in colic, but soon becomes unable to rise. The muscles of the haunches contract and are rigid.

Fig. 131—Azaturea.

Treatment.

Give eight drachms of aloes and administer enemas. The animal should be placed in a comfortable box stall, and turned from side to side every two or three hours. Warm fomentations should be applied to the loins. The ammoniacal liniment should be applied thoroughly to the loins. Ounce doses of alcohol may be given every four hours. In some cases aconite, twenty drops, may be administered with benefit. The urine must be removed with the catheter. It will be found to be of a dark brown color, similar to coffee. After the purgative has acted, nitrate and chlorate of potash, in three-drachm doses, should be

given for several days. Hypodermic injections of morphine may be employed with good results. The animal should be induced to get on his feet as soon as possible, that the secretions may be more regularly performed. During convalescence the animal should receive good food, and iron sulphate, drachms three; powdered gentian, drachms two, should be given until he is in a good condition.

XXXVI.

DISEASES OF THE HEART AND ITS MEMBRANES.

Heart disease is of rare occurrence in the lower animals, compared with its frequency in the human race. Diseases of the heart are divided into functional and organic functional derangement of the heart, characterized by palpitations, irregularity, or intermittence of the pulse, and may arise from debility, indigestion and many other diseases.

Organic disease of the heart is a disease of its substance.

CARDITIS.

Carditis inflammation of the heart substance occurs, and is usually circumscribed. In cases where the whole or a large portion of the substance is inflamed, death quickly occurs. If, however, it is circumscribed in character, recovery may take place, but there is a tendency to the formation of small abscesses.

Treatment.—Potassium bicarbonate, in doses of two drachms, should be administered. The animal should be kept quiet. Potassium chlorate is highly recommended. It should be given in two-drachm doses three times a day. Strong stimulants, or blisters should be applied over the region of the heart, and the bowels should be kept in good condition. The disease is not satisfactorily treated.

PERICARDITIS.

Inflammation of the pericardium occurs in all animals, but is most frequently met with in cattle. It may arise from injury, or it may be associated with chronic disease of any organ of the body.

Symptoms.—The pulse is hard and irritable, and easily excited. The respirations are a little quickened, and the mouth is hotter

than usual; the legs and ears are alternately hot and cold. The bowels and appetite are irregular. When hydrops pericardis results, a lingering death is the only termination.

Treatment.—The treatment is similar to carditis. To sum it up, fomentations to the side, warm clothing, bandaging the legs, with careful administration of medicines calculated to relieve the urgent symptoms arising during the progress of the disease, and supplying the animal with good food.

ENDOCARDITIS.

This consists of an inflammation of the lining membrane of the heart. It gives rise to symptoms similar to pericarditis. The treatment should be similar.

HYPERTROPHY OF THE HEART.

Hypertrophy is a condition in which the walls of the heart become thickened and the cavities enlarged. It is frequently seen in race horses and stallions. Concentric hypertrophy is that form of hypertrophy in which the walls of the heart become thickened and the cavities lessened. This disease is frequently associated with heaves and with valvular disease of the heart.

Symptoms.—Fainting fits and regurgitations of blood in the jugulars. The pulse varies considerably; it may be weak and quick or strong and hard. The diagnostic symptoms are not plain. Treatment is of no avail.

Heart Dilatation.—This condition is said to be most common in pampered and irregularly exercised animals. I have never been able to diagnose this condition from hypertrophy, but have seen it frequently during post-mortem. Potassium chlorate should be administered freely.

RUPTURE OF THE HEART.

Rupture occurs as a result of dilatation, occasioned while the animal is undergoing some severe exertion, as in racing. Death immediately results.

DISEASE OF THE VALVES.

Valvular diseases are exceedingly difficult to diagnose. They are generally due to a change of structure, caused by endocarditis, mechanical rupture, or morbid growths. Symptoms are indicated by difficult breathing when the animal is exercised.

Treatment is not satisfactory.

CYANOSIS.

This is more commonly called "blue disease." It is caused by the foramen ovale remaining open instead of closing, as it should, at birth. It is manifested by blueness of the visible mucous membranes, difficulty in breathing, and coldness of the surface. Animals so affected live but a short time after birth.

ECTOPIA CORDIS.

Misplacement of the Heart.—The most common form of misplacement of the heart is that in which the heart is situated outside the chest. When it is outside the chest it communicates with the interior of the body through a foramen.

FOREIGN BODIES IN THE HEART.

In ruminants, particularly cattle, foreign bodies often find their way into the pericardium, wounding both it and the heart. Cattle are exceedingly fond of chewing and swallowing all sorts of substances. The foreign body is taken into the stomach, and thence forced through the diaphragm into the thoracic cavity. Various substances have been found in the hearts of cattle, such as knitting needles, nails, a piece of iron wire two inches long, a plank nail, a hair-pin; a table knife 7½ inches long, passing from the reticulum to the left ventricle; a ramrod 14 inches long, etc.

Symptoms.—The animal shows general symptoms of heart disease. He may seem to recover, when in a few days the symptoms will return. When such symptoms are present the examiner may feel pretty safe in diagnosing it as a case of some foreign substances in the heart. Nothing whatever in the way of treatment can be done.

XXXVII.

AFFECTIONS OF THE DIAPHRAGM.

SPASMS OF THE DIAPHRAGM.

This is caused by over-exertion when the animal is in unfit condition. Its most prominent symptom is a convulsive motion, or jerking of the whole body, accompanied by a dull, thumping sound. The diaphragm is a thin, fan-shaped muscle, separating the thoracic cavity from the abdominal. It is situated posterior to the heart, and at once indicates the difference between the spasms or thumps of the diaphragm and cardiac palpitation.

Treatment.—All that is necessary is the administration of an ounce of alcohol and clothing of the body. If several doses of alcohol be necessary, they should be given every four hours.

RUPTURE OF THE DIAPHRAGM.

Rupture of the diaphragm is said to have taken place. I have never met with this lesion, and therefore do not know the symptoms presented.

XXXVIII.

PARASITIC DISEASES OF THE HORSE.

Parasites are distinguished as endoparasites, or entozoa, when living in the interior of their hosts, and as ectoparasites, or extozoa, when external. We will confine our attention entirely to entozoa, of which among the most important are those known as worms. These include not only round worms resembling the earth worms, but also worms resembling a band or a tape (tape worms), or a leaf (flukes), and thorny-headed worms. We have here to deal with the parasites of the horse. Those of other animals are treated elsewhere in this work.

The most important parasite is the tape worm, tænia perfoliata.

They contain four sucking discs, in length from one to five inches, and are found in the large intestines.

Symptoms.—There are no special symptoms of diagnostic value. The animal is generally in good condition when affected. He becomes weak, unable to keep up, sometimes running and stumbling in going down hill, or falling headlong.

Treatment.—Give the oil of male shield fern, in gruel or ball, from one-half to one ounce, or areca nut, one-half ounce. The bowels should first be cleared out by giving bran mashes and fasting. A sharp purgative should be administered about twelve hours after giving the worm medicine.

ASCARIS MEGALOCOPHALA.

This is a nematode or round worm, resembling the common earth worm in size and shape. The male is shorter than the female, and the average length is from six to eight inches.

They are found in the entire length of the alimentary canal, but generally in the small intestine.

Symptoms.—When the worms exist in small numbers they present little or no symptoms. If present in large numbers, there will be symptoms of abdominal pain. Wasting in appearance, the animal becomes pot bellied, with recurrent depraved, voracious appetite, dryness of the skin, and constipation, succeeded by diarrhœa. In some cases nervous symptoms will be presented. The owner may generally notice that the animal is passing worms. The prognosis is favorable.

Treatment.—Good water and good food are essential. Clear the bowels by giving a dose of oil or six drachms of aloes. Then give oil of turpentine, two, three or four ounces in a pint of linseed oil. Follow for seven days with similar treatment. A sharp cathartic should be given on the eighth day, such as aloes, eight drachms. Santonin in one to two drachm doses may be given. Another remedy is highly spoken of, as follows: Pulverized antimony tartar, one-half ounce; calomel, one-half drachm. Oil of Felix mass, one drachm; oil of savin, one drachm; pulverized ginger, one drachm; turpentine, one ounce, is also a good remedy.

OXYURIS CURVULA.

These are small, white worms, of needle or whip form. They are from one and three-quarters to four inches in length. They are found in the large intestines, and in great numbers. They inhabit the colon, being very abundant in the flexures of that intestine, but are more numerous in the rectum. They escape by the anus, and cause irritation by the horse rubbing its tail against any hard substance, or suddenly lifting the tail and turning it or switching while traveling. There is a yellow incrustation around the anus and adjacent skin, formed by eggs of the worms discharged from the body.

Treatment.—It is very difficult to destroy these parasites. Injections of common salt in solution are beneficial. Three ounces of turpentine and common oil should be given daily for several weeks. Tincture of aconite in the usual doses may be tried. When associated with emaciation and debility, four drachms of

the sulphate of iron may be given with advantage. Decoctions made of quassia, gentian, or wormwood, given as an enema, may be tried. The introduction of a small piece of mercurial ointment into the rectum is said to act very well. The animal's condition should be attended to, and effort must be made to render his body an unfit habitation for parasites. If the condition of the animal is good, parasites are not seen; or, if present, they will not multiply.

STRONGYLUS TETRACANTHUS.

These worms are found in the cæcum, and when matured are found in other portions of the bowels. The symptoms are not observed until several hours before death. They may wound the walls of the vessels, so as to cause intestinal hemorrhage and diarrhœa. A cure may be effected.

Treatment.—Give oil of tar in one or two drachm doses, night and morning, for several weeks.

BACTERIA.

The vegetable organisms, which have been found connected with the disease of animals, are plants in which no distinction exists between stem and leaf, belonging to the class of fungi. The pathological fungi are of three kinds—bacteria, yeast, and molds. The bacteria, besides causing putrefaction and several of the fermentations, include most of the organisms which are believed to produce infective diseases. They are, therefore, by far the most important group. They are rounded, ovoid, or spiral in shape; are unicellular and devoid of chlorophyll. They consist of protoplasm enclosed in a membrane, having a great affinity for certain stains, and, in common with vegetable matters, are not destroyed by ammonia, potash, or weak acids. They have the power of production, and some of them have motion.

Each variety of fungus seems to differ more or less from all others in its food requirements, but all must be supplied with the materials of which they consist. These are carbon, hydrogen,

nitrogen, phosphorus, sulphur, calcium, magnesium, and potassium. The presence of water is essential to the development of all fungi, as a medium for conveying oxygen and food substances into the cell. Each organism flourishes best at its special temperature. It is held that bacteria do not reproduce at 5° C., and many require a much higher point; but they do not necessarily die at lower temperature. Some are not killed by the greatest cold, and it is uncertain that any die from extreme cold. Some bacteria are frozen in fluids at minus 110° C. without injury.

These organisms are found in putrid wounds, in which they fairly swarm. They may enter from the exterior, developing only under special circumstances; or they may be spontaneously generated in the body under special circumstances, from elements of the tisues. Earth, air, or water may be the habitat of germs external to the body. They exist in earth in the neighborhood of putrefaction. Koch found that all organisms are absent at a depth of one meter in soil not recently disturbed in winter, and not formed largely of decomposing material, and into which no usual leakage of water occurs.

Dust contains much organic matter, as is easily shown by combustion, and cultivation proves that some of this is living. The air is supplied with organisms swept by currents from objects over which they pass. The dust left as the final result of putrefaction is a fertile source of contamination. Perfectly still air becomes pure by subsidence of its germs. All water, except such as comes from a great depth, as in Artesian wells, contains organisms. Rain water sweeps the air and infects the soil with the germs which it carries down. All surface water is infected from the ground through which it soaks, and too often shallow wells are contaminated by sewerage. River water is exposed to all possible sources of pollution.

These organisms exist in large numbers on the external skin, and internally on the bronchial and alimentary surfaces which are in contact with air. They are carried into the alimentary

canal by food and drink. All kinds of fungi swarm in the mouth. Organisms are present in healthy bodies. They probably pass continually through the pulmonary and intestinal mucous membrane, but in small numbers. Such as ordinarily thus enter the tissues are unable to develop, so long as the body is healthy. All organisms, perhaps, flourish best in tissues of which the vitality is impaired; some, probably, cannot develop unless this is the case, and still others cannot multiply at all in living tissue. The acute specific diseases, heretofore referred to, are now regarded as forming a class of the much larger groups of infective diseases.

An infective disease may be defined as a disease due to the action of a poison or virus, which has the power of invading and multiplying in living tissue. A contagious disease is communicable only from individual to individual, the name implying actual contact with the poison. Infectious diseases are communicable without actual contact with the poison, the victim usually being attacked from a distance.

Bacteria are the causes of many diseases. Their classification will not be given here. Parasites and diseases which they produce have been treated throughout this work. For fuller and more particular treatment of the subject, the reader is referred to special works on bacteriology.

CATTLE.

XXXIX.

CONTAGIOUS DISEASES OF CATTLE.

CATTLE PLAGUE.

This disease, known also as Rinderpest, is a specific, malignant, and contagious fever, prevailing particularly in the Asiatic countries. It is not known in America. If found in this country at all, it arises from direct or indirect communication with imported cattle. The period of incubation varies from four to eight days, at the end of which time the local manifestations are developed. Like all fevers, it runs a definite course. It usually terminates fatally; but where recovery takes place, the animal is rendered unsusceptible to another attack. It is peculiar to the bovine family, but has been communicated to sheep, goat, deer, camel, giraffe, antelope, and gazelle.

The disease is induced by a streptococcus, which causes a morbid state of the blood. Serum obtained from the blood of affected animals may produce the disease in another animal by inoculation. The morbid poison is also contained in the discharge from the mouth, eyes, and intestinal canal. If a small portion of this be placed in the blood of a healthy animal, the whole mass of blood will become infected in forty-eight hours, and if a small portion of this newly inoculated blood be inoculated in still another animal, it will transmit enough poison to give the disease to the other animal. The morbid poison may be diffused and the disease communicated by the air for a distance of about five hundred yards; but it is said that beyond this distance the poison is inoperative. It is also conveyed by flies, which, after rising from a sick animal or its offal, alight on healthy animals. Many theories have been advanced as to the true nature of the plague and its identity with various human

diseases. German pathologists held for a considerable period that the disease was a precise counterpart of typhoid or enteric fever. Dr. Murchirons, however, successfully combated the theory, pointing out its error, and declaring that it had no resemblance to typhoid fever, typhus, scarlatina, erysipelas, influenza, or dysentery, but that it resembles small-pox. He was so enthusiastic in his theory that it led to the belief in vaccination as a preventive, and during the plague of 1866 the cattle were immediately vaccinated throughout the country; but it proved a total failure.

Symptoms.—The fever, as shown by elevation of the temperature, begins when the poison has infected the whole mass of blood, or within about forty to sixty hours after its entrance into the system. Two days after the perceptible rise in temperature has begun, an eruption on the mucous membrane of the mouth is seen; almost simultaneously with this appearance of the mouth, the mucous membrane of the vagina of the cow is peculiarly affected. It is stated that one or the other of these signs is rarely absent. On the day following the eruption in the mouth, or about seventy-two hours after the first elevation of temperature, the animal may be observed to have less appetite than usual, and to ruminate irregularly. On the following day, the fourth from the first rise of temperature, the animal for the first time shows marked symptoms of illness. Death usually occurs on the seventh day from the first perceptible elevation of temperature.

Dr. Jessen says: "The appearances observed by me on the mucous membrane of the mouth, both in the natural and inoculated disease, are as follows: In some cases small round nodules, seldom larger than a millet seed, are observed, which are still covered with epithelium, through which a yellowish or yellowish-gray material can be distinguished. A few hours later, sometimes not till twenty-four hours, the epithelium gives and the contents become visible; hence results a superficial lesion, which, after the removal of the material lying upon it, is scarcely recog-

nizable. It heals in a few days, leaving no cicatrix. In other cases these nodules become confluent, giving rise to an excavated ulcer of considerable extent, with irregular margins, which, however, usually heals quickly, leaving a cicatrix. In another form of the affection, the epithelium is raised in the form of small vesicles, which contain either a clear or slightly turbid fluid, and leave behind shallow, round excavations, with smooth edges."

The visible external signs are shivering, muscular twitchings, restlessness, often a husky cough, and yawning. Great dullness is shown, with dropping of the ears, sometimes with excitement approaching delirium, loss of appetite, suspension of rumination, and secretion of milk is arrested. As the disease advances, the animal incessantly grinds its teeth, arches the back, draws its legs together, and moans. The eyes, mouth, and nose are at first dry, hot, and red; the legs and ears generally cold. At first the bowels are constipated, but this condition is succeeded by violent purging, and the dry condition of the eye, mouth, and nose is followed by a discharge. The expiratory movement is rather long, and accompanied by a low moan. The animal will show colicky pains, and the intestinal discharges, at first black, become a pale greenish-brown color.

Some few are said to recover. In such cases it is observed that the skin over the neck becomes covered with a yellowish sebaceous secretion, but there are no vesicles or pustules. While the disease is highly contagious, it is found that some cattle resist its influence, remaining healthy while surrounded with the plague. The post-mortem appearances of the cattle plague vary in different stages. In the first stage, there is congestion of the mucous membranes throughout the body. The surface of the mucous membrane is covered with a vesicle, tenacious and with a bloody secretion. The membrane is denuded of its epithelium, and the submucous tissue is charged with a turbid semi-fluid exudate. The first stomach shows patches of congestion, and in some cases sloughing of the membrane has been observed. The third stomach is impacted, the contents dry and caked, and

moulded to the papillar surface of the fold of the stomach. In some cases the leaves of the omasum are quite healthy; sometimes they are highly reddened, the vessels which radiate from their attached borders being more or less injected, and sloughing may occur in patches. The fourth or true digestive stomach, the abomasum, shows the effects of the disease quite plainly. The contents of the stomach are fluid, and sometimes mixed with blood. In addition to the general redness, the membrane presents circular or irregular patches of a claret color, varying in size from a mere speck to a five-cent piece. The color may be uniform over the patches, but at other times it may be limited to its circumference, forming a colored rim, with a central grayish-yellow portion. In the small intestines spots of inflammation exist. The discolorations vary, some spots being scarlet or rose red, while others are of the deepest purple. The large intestines are also affected. The lining membrane of the respiratory organs presents signs of congestion. The lungs and heart show well-marked signs of the disease.

Treatment.—Treatment is unsuccessful. The disease when induced by inoculation has proved of a less severe nature, and the percentage of recoveries has been greater than in cases induced naturally; but it is almost as severe as that arising from natural rinderpest. If it should gain access to our shores, there is only one method of dealing with it, and that is to stamp it out by destroying not only all affected with it, but also those which have been in contact with affected animals.

CONTAGIOUS PLEURO-PNEUMONIA.

This is a contagious febrile disease peculiar to horned cattle. It is due to a specific virus which gains access to the system by the lungs. The incubative stage is slow, being two weeks or a month, and the progress of the disease is also of lingering character. The disease induces an extensive exudation within the substance of the lungs, and upon the surface of the pleura, ultimately resulting in consolidation of the lungs. This disease was

brought to our own shores. It first originated in central Europe, and finally spread all over Europe. It gained access to America, Great Britain, Africa, India, Australia, and New Zealand. The first appearance of the disease in the United States was in the year 1843. The disease prevailed in the eastern part of the United States, in New York, New Jersey, Delaware, Maryland, Pennsylvania, and in the neighborhood of the city of Washington, and later in Ohio, Kentucky, and Tennessee.

Symptoms.—The disease may run a rapid course, destroying life in a few days, but the majority of cases run from two to eight weeks. The animal, becoming much emaciated, finally succumbs to an exhausting diarrhœa, hydrothorax, and blood poisoning. The first symptom is an increase of temperature. Investigation has proven that extensive changes may exist without elevation of temperature. It cannot, therefore, be depended upon as a guide to its true commencement. But it is of great importance during an outbreak to make examinations with the thermometer, in order to warn the owners of stock in time to isolate the animal. In suspected herds, if any should show a temperature of 102 degrees, it should be regarded with suspicion. When the disease is well established the temperature rises to 105 or 106 degrees, and in some cases 107° F. There will be slight shivering, loss of appetite, diminished secretion of milk, knuckling over of the right hind fetlock, and the painful cough of pleurisy. Rumination becomes irregular, the animal appears fuller than the rest of the cattle, although not eating. The bowels are constipated, the urine scanty and highly colored, and the animal is hide-bound. Auscultation at this stage of the disease will denote nothing unusual. The animal may show signs of improvement, and may ultimately recover, or may pass on to the second stage of the disease, when all of the symptoms above mentioned are intensified. The animal stands with the elbows turned out, the back arched, the limbs drawn under the body and knuckling over at the fetlocks. When in a recumbent position, he throws the weight upon the sternum. The breathing becomes painful, ac-

companied by a grunt or moan. A discharge sometimes issues from the eyes and nose, the horns and ears are cold, and no sound is heard on auscultation. A slight tympanitic condition may occur, with an offensive diarrhœa, grating of the teeth, and gangrene of the lungs, followed by death. Young animals are more subject to the disease than old ones.

Post-Mortem Appearances.—There is a dullness of the pleura, the substance of the lungs is red and congested, giving them a marbled appearance. There is a consolidation of the lung, which will sink when placed in water. The pleura is also involved, and an effusion into the pleural cavity has taken place. The ribs present a bare appearance, being stripped of their pleural covering, and have an unnaturally white appearance. The disease is susceptible of transmission from sick to healthy animals by cohabitation, or even without immediate contact, as it may be taken at a distance. Stables occupied by diseased animals are not safe for healthy cattle for several months. The disease has been produced in healthy animals by allowing them to run upon pastures three months after diseased cattle have occupied them. Hay soiled by infected animals has also produced the disease three months afterwards. Twenty per cent of animals resist the contagion. Eighty per cent manifest various effects of its influence. Fifty per cent are seized with decided symptoms of pleuro-pneumonia, and of these fifteen per cent succumb.

Treatment.—Treatment is not advisable. Slaughter and burial is the most effectual remedy.

Disinfection.—All sheds, cow-houses, or other premises which have contained cattle affected with the disease, should be thoroughly cleansed and disinfected. The best and cheapest way is to burn sulphur in the buildings; to whitewash the stalls, roof, and every portion of the building with lime wash containing carbolic acid, in proportion of one pint of crude acid to each bucketful of whitewash.

INOCULATION.—Inoculation has been practiced for a number of years, at first with not much success; but later with a great degree of success. Inoculation produces not the disease, but a fever which is easily overcome; after which the animal is safe from pleuro-pneumonia. The method of inoculation is as follows: The blood and the serous and frothy liquid are squeezed from the lungs of a diseased animal in the first stages of pleuro-pneumonia. The fluid while warm is placed in a strainer, over a clean glass bowl covered over with cloths to prevent dust, and to keep it warm. The fluid, if not required for immediate use, is to be placed in glass tubes or bottles, and the tube hermetically sealed by a blow-pipe flame. The tip of the tail should be selected for inoculation, and the superior is better than the inferior surface of the tip. The tip of the tail is selected because it can be easily amputated, should gangrene occur. The hair should be removed from the spot, and the skin scarified superficially. A single drop of the virus should then be placed on the scarified spot. At a period varying from a week to two months, a slight heat and swelling occurs around the inoculated spot; generally, however, the eruption manifests itself from the ninth to the sixteenth day, accompanied by slight rigor, loss of appetite, and slightly diminished secretion of milk. The inoculation method has not yet been fully established. Laws have been enacted whereby all animals suffering from an attack of pleuro-pneumonia, or in any way having been exposed to the infection, shall be slaughtered within a specified time.

FOOT AND MOUTH DISEASE.

This disease is also known as eczema, contagiosa, and by many other names. This is a highly contagious and infectious febrile disease, characterized by secular eruptions in the mouth, between the pedal digits and around the coronets. In some cases the eruptions are absent in the mouth and present only in the feet, and vice versa. Eruptions are sometimes seen in connection with the mammary glands; when such occurs the milk is unfit for use.

This disease is not confined exclusively to cattle, but affects sheep, pigs, dogs, poultry, and even human beings. Cattle, however, are more susceptible to the influence of the contagious poison. The period of incubation is very short, varying from twenty-four hours to three or four days. The disease is characterized by an elevation of temperature, of from two to four degrees; the presence of vesicles on the tongue, lips, and roof of the mouth, between the digits, and around the coronets, and in some cases on the udder. There is a discharge from the nose and eyes. The symptoms of the presence of vesicles in the mouth are shown by the animal constantly moving the lips, champing of the jaws, a flow of saliva from the mouth, and difficulty in feeding. When affecting the feet, there is some degree of lameness. These symptoms arise from the elimination of the poison from the system; when eliminated by the feet and mouth, pastures become impregnated with it. In this way it is spread, being carried from pasture to pasture, and across the country by dogs and small game. An animal is never attacked more than once in a season, as a rule. The milk of a cow suffering from foot and mouth disease should not be given to pigs, young calves, or to human beings. The loss to dairymen from the diminished secretion of milk, consequent on foot and mouth disease, is very great. On an average the loss would be about twenty dollars a head.

Treatment.—Foot and mouth disease is one that terminates in recovery. Mild cases require little medicinal treatment. Plenty of good, cold water is generally all that is necessary, with the addition of soft food, as bran mashes. If the fever be very high an ounce of nitrate of potash, dissolved in each bucket of water, and thirty drops of aconite administered every four or five hours. The feet should be carefully washed, and acid carbolic, drachms six; lead acetate, ounces two; zinc sulphate, ounce one and a half; water one quart; creolin is excellent.

VARIOLA VACCINAE (Cow-Pox).

This disease is seen in most parts of the globe, and is not attended with any great fatality. It is a contagious, febrile, and eruptive disease, resulting from the presence of a specific virus in the body. The period of incubation is from six to nine days. The disease causes eruptions, principally upon the mammary gland. The disease runs a definite and mild course, and destroys the susceptibility of the affected animal to another attack. The origin of the disease is not known. Jenner believed that cow-pox and small-pox had their common origin in the "grease" of the horse. Whether man had the disease communicated to him from the lower animals, or whether horses and cows had it from man is not determined. The origin will perhaps forever remain a mystery. But let that be as it may, the disease, through the experiments of Jenner, who directly communicated it by vaccination from the lower to the higher animals, has proved a blessing to millions of the human race. The local symptoms of true variola are heat, swelling, and tenderness of the teats for three or four days, followed by irregular pimples, more particularly about the base of the teats. When the pimples are about the size of a pea they assume a red hue. They gradually increase in size, are painful and hard, becoming circular in form on the udder and oblong on the teats. Finally, they rise in the center, become pointed, and contain at first a clear, and ultimately a turbid, fluid. They reach their maximum size about the tenth day, and are then pustular; as the pustules dry, dark brown or black solid scabs or crusts form upon the surface. Vesicles, pustules, and scabs may be seen on the teat at any time. The crusts, if left undisturbed, gradually become thicker and darker, until about the fourteenth day; at the end of three weeks they spontaneously separate, leaving shallow, smooth, oval, or circular pits of a pale rose color, with some traces of surrounding induration. If the vesicles are broken during their progress, troublesome sores supervene, the discharge from which will communicate the disease

to the milker, if he is not already protected by previous vaccination. The flow of milk is arrested to a certain extent, and there is a rise in the temperature. Pyrexia is always present. The disease seldom or never proves fatal in this country. In hot climates, however, it is more severe; the symptoms being succeeded by abdominal pain, profuse diarrhœa, rapid wasting of flesh, and death.

Treatment.—In severe cases a laxative may be given, and carbolized oil used locally, or the calamine ointment may be used. Great care must be exercised to prevent exposure to draughts of cold air. The animal should be isolated from the rest of the herd. When once the disease breaks out in a dairy, it is apt to spread to the whole herd unless precaution be taken by separating all affected animals and the employment of separate attendants. The milker of an affected cow should not touch a healthy one. The milk should be drawn off with a teat syphon, and if the mammary gland becomes much swollen, fomentations should be used, with treatment as in a case of mammitis.

The contagium of variola vaccinæ is an extremely small form of micrococcus, usually called the diplococcus variolæ et vaccinæ. Jenner was the first investigator who discovered the identity of cow-pox and small-pox. The results of his investigations have saved the lives of millions of the human race.

ANTHRAX.

The symptoms of anthrax fever in the ox are similar to those in the horse. For full information as to the nature of the disease, see Anthrax of the Horse. The ox suddenly goes off its feed; rumination is suspended; there are rigors and tremblings, and partial sweats bedew the body, which is alternately hot and cold. The gait becomes staggering, and the animal rapidly exhausted. The animal lies down and is not able to rise. He looks to the sides, falls into convulsions, and may expel soft, bloody matter by the anus. The heart beats violently, the pulse is small, rapid, and intermittent; the conjunctiva shows a blackish-red tint; the

respirations are panting; the abdomen tympanitic; the lung blush red; the mouth is filled with mucous, and there is an escape of blood from the nose; the eyes are sunk, and tears flow over the cheeks. Death may take place in a few minutes or in twenty hours. In cattle above two years old, particularly milch cows, the spleen is greatly congested. This gave rise to the name, splenic fever. In true splenic apoplexy, the spleen is enlarged and its capsules distended with a mass of tar-like blood. In another form of anthrax, without external tumors, the most prominent sign is a passage from the bowels of a quantity of dark colored blood.

Death from splenic fever is very sudden. An animal, a few hours before in good health, may be found dead, having died apparently without a struggle, though some cases may linger several days. The disease is seldom seen in this country.

For treatment in cattle, see the treatment of anthrax in the horse. Food from diseased animals should be strictly forbidden. Milk from cows affected with anthrax is unfit for the use of man or other animals. All incurable animals should be destroyed and buried deeply, and all alimentary matter buried with them. Those that are curable should be isolated from the herd and the place disinfected thoroughly.

QUARTER ILL, OR BLACK LEG.

This disease, under numerous names, is well known to stock-raisers. It is frequently seen in this country. The disease affects cattle and sheep only, and is due to the presence of an organism. It occurs much more frequently in young animals than in old ones. Animals affected under two years old almost invariably die, but animals over that age frequently recover. It is seldom seen in calves under six months old, unless fed exclusively on a diet other than a milk one. The disease occurs most frequently when animals are changed from one pasture to another, especially when changed from poor feeding to rich pastures. The disease is also most prevalent in low-lying lands.

Symptoms.—There is loss of appetite, dullness, cessation of rumination, harshness, and starring of the coat, elevation of temperature, rigors, coldness of the extremities, lameness or stiffness when moved, and arching of the back. If the skin be examined, tumors will be found forming under it in some parts of the body. The tumors may occur in any part of the body, but most frequently in the shoulder or the loins, and more frequently on the right side than on the left. The tumors are ill-defined and have no lining membranes. They are first hot and painful to the touch, and then become cold and insensitive. If incised, a dark colored and fetid fluid is discharged. As the disease progresses, the tumors enlarge and the animal shows great pain. The breathing becomes hurried, the temperature rises, the pulse beats 120 to 130 per minute; tympanitis varies in individual cases. In some cases there are lameness and stiffness in one limb, with no appearance of a tumor. In some there are symptoms of derangement of the digestive organs. On post-mortem examination, the animal is found to be enormously swollen. Bloody froth is seen issuing from the mouth, nostrils, and anus. On opening the animal gases of bad odor escape, accompanied by spurts of dark blood. The tumors are black, and are found principally in the loins and withers. In some parts of the country such animals are used for human food. I am of the opinion that it is dangerous to human life. The disease is due to a very small germ measuring from $\frac{1}{25000}$ to $\frac{1}{5000}$ inch in length. The germs are found principally in the tumor. Protective inoculation has been practiced with great success, rendering the animal immune to the disease. The germs are taken from the tumor and injected into the jugular vein by means of a hypodermic syringe. The blackest portion of the tumor is cut into small pieces, mixed with distilled water, then triturated in a mortar, squeezed through cloth, and filtered through folds of muslin. Five to ten drops of this fluid is used as an injection.

TEXAN FEVER.

This disease has been described as anthrax. In this country the term is applied to diseases arising from various causes, as ticks, and want of water during hot months. Dr. Salmon and Dr. Cambridge claim through their experiments that the disease is due to a particular micrococcus, and that by vaccination the animal is able to resist the contagium. I have frequently met with fever in cattle confined to low lands, especially in the cattle of Virginia. Cattle brought from the low lands of Virginia to the mountainous parts of the State suffer greatly with the disease. It occurs during the hot summer months when grasses are ripe and the water becoming low. I have seen as many as fifteen die in a herd in one day. This condition was caused by malarial influences.

Symptoms.—The animal will be noticed to stray from the herd, its head hanging low and the breathing rapid. The muzzle is hot and dry, and the animal greatly fevered. The bowels are constipated and the urine dark or of a violet color. The animal after about twelve hours sickness grates its teeth, shows abdominal pain, the breathing becomes more labored, and the eyes take on an amaurotic condition. The animal staggers, falls, and dies in a few hours.

Treatment.—Medicinal remedies are of no use, either in young or old cattle. Purgatives of every description, and in various quantities, have no effect on the bowels, and when the disease once attacks an animal no remedies can save it. The disease indicates the use of purgatives, enemas, and the chlorate of potash, but, as stated before, a cure cannot be affected.

Preventive Treatment.—I have always changed the animals to another pasture, selecting a field of new clover or new, fresh pastures. If in low countries, where the new grasses cannot be obtained, they may be herded around the swamps, eating grasses in close proximity to the water only. Each animal should

receive a pound of epsom salts and a pound of table salt in a drench, when changed to the new pasture. This treatment will effectually stamp out the disease in a few days' time.

Post-Mortem.—The post-mortem revealed the fecal matter in the reticulum dry and caked to the mucous membrane, the bladder distended with dark or purple colored urine. This disease resembles Texan fever and anthrax, but it is not the same disease, as is generally supposed. It is no doubt due to the effects of climate and the condition of pastures and water.

TUBERCULOSIS.

This disease is commonly known as consumption, and is due to a vegetable parasite, the bacillus tuberculosis. It affects man and all other animals, but is much more prevalent in cattle. In 1882 Koch announced his discovery of the bacillus or germ of tuberculosis, and was the first to demonstrate, by a special process of staining, the constant presence of the peculiar bacilli in cases of acute tuberculosis. The bacillus is a small, rod-shaped organism from one seven-thousandth to one ten-thousandth of an inch long, and one-tenth as broad. They are usually straight, but may be curved. They occur singly, but sometimes by pairs. Multiplication is very slow, and takes place by division, by spore formation. They multiply only in the body of man and other animals. They cannot multiply external to the body, but can live and retain their virulence, external to the body, for forty-three days in putrid sputum, and one hundred and sixty days in the dry state. The bacillus enters the body through wounds or broken skin. The mucous membrane, pulmonary and digestive, affords passage, and is the most frequent mode of entry. In the former, the germs are inhaled in the form of dust; in the latter, they are taken in the alimentary canal by infected milk or meat. Having found a spot in which it can grow, the bacillus proceeds to multiply. Most bacilli are taken up by cells, which enlarge into giant cells and become the centers of typical tuberculosis. Their presence excites more or less inflammation, and cassation

soon follows, the nearest lymphates becoming affected. The mode of spread is by continuity of tissue, and by lymphatic veins, arteries, and by the affection of one part from another. The germs may pass through the lungs, thence by the pulmonary capillaries to the systemic circulation. We are able to recognize the presence of tuberculosis in the dead animal by the characteristic tubercles—the formations which give the disease its name. These tubercles are small, hard masses, which may be present in almost any part of the body, but are most frequently found in the lungs, pleura, peritoneum, liver, intestinal walls, and the lymphatic glands belonging to these organs. The tubercle is, at first, a small, grayish, opalescent mass, the size of a millet seed, which may be single or a number may be found side by side, thus making a large, diseased area. As the tubercle or tubercular mass grows older it becomes yellow, and forms a cheesy mass. Especially is this noticed in connection with tubercles in the lungs. We have here the yellow and the gray. The gray are semi-transparent nodules of a grayish-white color, varying in size from a pin-head to a hemp seed or shot. They are somewhat spherical in shape, and usually possess a well-defined outline. The yellow are much larger. I have seen in the lungs of cattle large cavities filled with a yellowish thick fluid mass known as tubercular abscesses. Some of them are larger than walnuts. They are irregular in outline. When the tubercles are situated in the pleura or peritoneum, the growths are usually hard and nodular. The normal smooth and glistening surface is dotted or thickly studded with sound, hard masses, ranging from the size of a mustard seed to that of a grape. In the liver the tubercular masses are similar to those of the lungs. Immense numbers of these tubercles may conglomerate to form a collection of diseased products, as large as an apple between the lungs and chest wall; masses even larger are found. If one of the diseased lymphatic glands be cut across, it will be noticed that small, yellow spots dot the cut surface. Sometimes the whole center of the gland is taken up by this cheesy substance. In other cases the gland be-

comes hard and gritty from the deposition of lime salt. If the udder is affected yellow spots or tubercles are discernible on the cut surface; the entire quarter is enlarged and hard, and the lymphatic glands of the udder are usually tuberculous. In the intestines the morbid process is most marked at the lower end of the ilium and in the cæcum. The appendix is sometimes affected; also the duodenum and rectum. The germs reach these parts through infected milk or meat. The urino-genital tract may also be a seat of tubercular infiltration. In the brain, the masses vary in size from a hazelnut to a pigeon's egg, and commonly occur in the cerebral substance, especially at the base of the brain. They are of a pale yellow color, and usually form quite round globular tumors. Their surface is often seen to be covered with minute gray nodules, which extend into the surrounding tissue.

If a tubercular mass be examined microscopically, it will be found that those tubercles near the circumference of the diseased area contain the largest number of active bacilli, and that these germs are thus favorably situated to invade the surrounding tissues, or to be carried by the lymph or blood vessels to distant parts of the body, and there set up the tubercular process. The disease has prevailed throughout the old and new world. It is much more prevalent in some races of cattle than others, and is much more common in the milk than the beef breeds. The country in the vicinity of large cities contains a larger percentage of tuberculous animals than more remote localities. It is not, however, the proximity of the cities which leads to the prevalence of the disease, but the system of housing and caring for the animals practiced in such districts.

Tuberculosis is not developed in every animal which inhales or injects the germ, because all animals are not equally predisposed. Close stalling, poor ventilation, feeding on innutritious food, and all the influences of domestication predispose the animal to the disease. Where these depressing causes exist, it is much easier for tuberculosis to start and spread. But no matter how weak a

cow is, or how little vitality she may have, she can never develop tuberculosis unless the germ is introduced into the system. When the germ is taken in, if the animal be strong and have no inherited weaknesses, the bacillus is expectorated, or is destroyed by the cells where it lodges, or may be thrown off through the alimentary or urino-genital tract. Every influence which weakens the constitution or resisting power of the animal is a predisposing cause, and favors the development of the disease when the germs are present. The disease is unquestionably contagious, and numerous instances have been published in which it has extended along a row of cattle in both directions from a subject of tuberculosis. Thousands of experiments prove conclusively that animals have tuberculosis, and that it is transmitted from one to another, and from infected cows to human beings. I have dealt at length on this subject because it is one that should interest the people greatly. The spread of this disease over the whole world, with the exception of the Polar regions, the steppes of Russia, and portions of Africa, and the percentage of cattle affected in herds should receive the careful consideration of the public generally.

Symptoms.—Unthriftiness, decrease in milk, abortion if in calf; the appetite capricious, mucous membrane pale; a dry, dull cough, skin and hair dry and dusty; skin yellow, and the animal ceases to lick itself. As emaciation proceeds more rapidly, the digestive organs are weakened, and diarrhœa reduces the animal to a skeleton. Auscultation and percussion may reveal the lungs diseased. In many cases the thoracic cavity becomes partially filled with blood, as does also the abdominal cavity. The animal on getting up in the morning may cough several times. This may be noticed to increase for months before there is much loss of flesh. Such a cow should be looked upon with suspicion. A reliable means of diagnosis has been given us by Robert Koch, of Berlin, in what is known as "Koch's lymph of tuberculine." Where properly used it is an infallible diagnostic agent. Since it was first tried on cattle by Prof. Gutmar, of the Veterinary

Institute, Darpart, Russia, in January, 1891, thousands of experiments have been made with satisfactory results in all cases.

TREATMENT.—It is a waste of time and money to treat this disease. The time has arrived when this disease should be stamped out, and included in the contagious disease, animal act.

GRASS DISEASE.

This disease prevails in different parts of Scotland, and occurs from the end of April until the middle of June, the period when grasses begin to ripen. All ages and breeds of animals are alike liable to the disease when put on fields favorable to its development. It is most frequently seen on light, gravelly land, and especially poor land. Rye grasses are most favorable to the production of the disease. The animals generally are on pasture about a month before they are attacked. It is always worse on first year's grass.

SYMPTOMS.—The animal loiters about, feeding occasionally, and if it lies down a characteristic flapping or restless movement of the ears may be observed. If you attempt to drive the animal from the field he will become excited, and generally becomes blind before going very far. There will be purging of a black and watery character. The cow refuses all food and water, the milk suddenly fails, and she grates the teeth. The pulse is accelerated, extremities cold, and the animal blind. The temperature is not elevated, and the disease runs a course of three days before the crisis is reached. At this period the animal is intensely excited with violent tremors, bellows fearfully, presses its head against the wall, or, if unfastened, scrambles up against the wall, staggers, falls, and dies.

POST-MORTEM APPEARANCES.—The contents of the manyplies are soft and in a healthy condition. The only lesion observed is an inflammation of the true stomach and bowels, evidently due to some narcotic.

TREATMENT.—Treatment is unsatisfactory. When the animal is in good condition, immediate slaughter is to be recommended. This disease has not been seen in America.

XL.

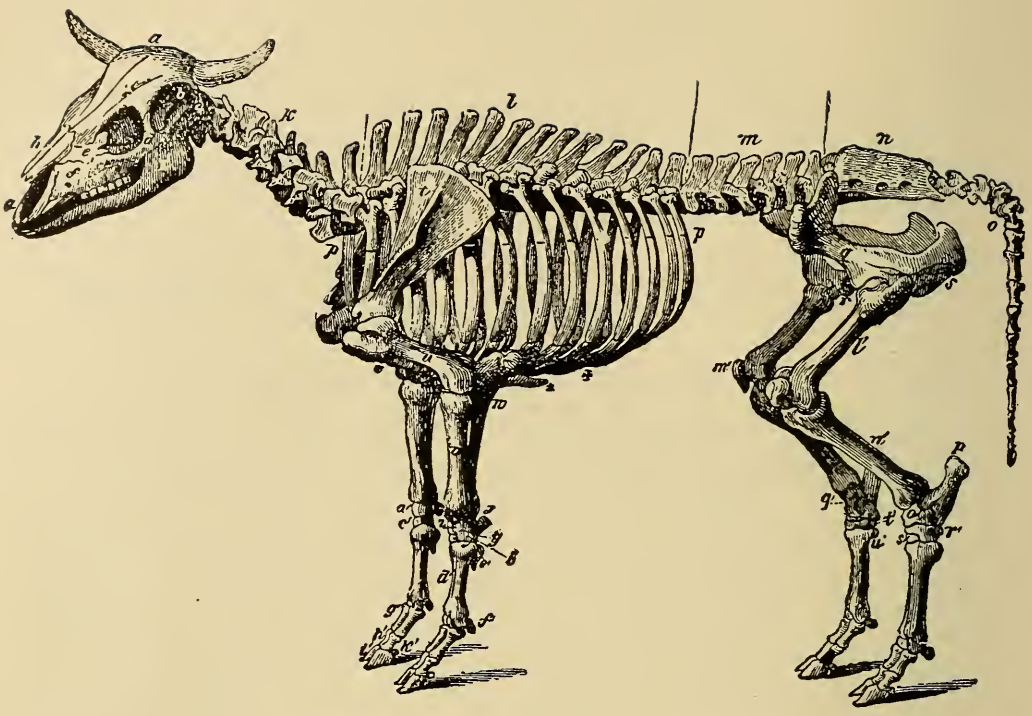
ENZOOTIC AND EPIZOOTIC DISEASES OF THE OX.

MALIGNANT CATARRHAL FEVER.

This disease is due to a specific virus which affects the mucous membrane lining the sinuses of the head and nasal chambers.

Symptoms.—Rigors, dullness, and debility. The mucous membrane becomes of a bluish-red color, the eyes are closed, the eyelids swollen, with flowing of tears over the cheeks. The animal coughs incessantly, the pulse is feeble, and the bowels are very loose. In the course of a few hours after the onset of the disease, a profuse discharge issues from the nostrils, mouth, and eyes. The sinuses of the head become filled with matter, and in some instances the horns fall off.

Treatment.—The disease is very fatal, and causes death in from three to seven days. If the animal lives over seven days a cure may be expected. The patient should be placed in a warm shed. Enemas should be given to relieve constipation. Two ounces of sweet spirits of nitre should be given every four hours, diluted in a pint of water. The animal should be made to inhale hot steam.



SKELETON OF THE OX (RUMINANTIA).

AXIAL SKELETON.

THE SKULL.

Cranial Bones.—Occipital, 1; *b*, Parietal, 2; *a*, Frontal, 2; *c*, Temporal, 2; Sphenoid, 1; Ethmoid, 1; Auditory ossicles, 8.

Facial Bones.—*h*, Nasal, 2; *e*, Lachrymal, 2; *d*, Malar, 2; *f*, Maxilla, 2; *g*, Premaxilla, 2; *i*, Inferior maxilla, 2; Palatine, 2; Pterygoid, 2; Vomer, 1; Turbinals, 4; Hyoid (segments), 7. Teeth—Incisors, 6; Canines, 2; Molars, 24.

The Trunk.—*k*, Cervical Vertebræ, 7; *l*, Dorsal vertebræ, 13; *m*, Lumbar vertebræ, 6; *n*, Sacrum (five segments), 1; *o*, Coccygeal vertebræ (variable), 20; *p p*, Ribs, 26; * Sternum (seven sternebræ), 1; ⁘ Costal cartilages.

APPENDICULAR SKELETON.

PECTORAL LIMB.

t, Scapula, 2; *u*, Humerus, 2; *v*, Radius, 2; *w*, Ulna, 2. Carpus—*x*, Trapezium, 2; *y*, Cuneiform, 2; *z*, Lunar, 2; *a'*, Scaphoid, 2; *b'*, Unciform, 2; *c'*, Magnum, 2. Metacarpus—*d'*, Large bone, 2; *e'*, Small bone, 4; *f'*, Large sesamoids, 8. Digit—*g'*, Proximal phalanges, 4; *h'*, Mesian phalanges, 4; *i'*, Distal phalanges, 4; *k'*, small sesamoids (naviculars), 4.

PELVIC LIMB.

Pelvis.—Os Innominatum—*q*, Ilium, 2; *s*, Ischium, 2; *r*, Pubis, 2.

The Limb.—*l'*, Femur, 2; *m'*, Patella, 2; *n'*, Tibia, 2. Tarsus—*o'*, Maleolar, 2; *p'*, Calcaneum, 2; *q'*, Astragalus, 2; *r'*, Cubo-cuneiform, 2; *s'*, Cuneiforme medium, 2; *t'*, Cuneiforme parvum, 2. Metatarsus—Large bone, 2; *u'*, Small bone, 2. Large sesamoids, 8. Digit—Proximal phalanges, 4; Mesian phalanges, 4; Distal phalanges, 4; Small sesamoids, 4.

VISCERAL SKELETON.

Bones of the heart, 2.

The separate bones of the Ruminant Skeleton, as here considered, are 251.

XLI.

RESPIRATORY DISEASES OF THE OX.

CATARRH.

This disease does not occur quite as frequently among cattle as in the horse, but it is not uncommon. It arises from inflammation of the mucous membrane lining the nasal cavities. Cattle do not suffer with catarrh as frequently as horses, because they better endure foul air and confinement.

Causes.—The causes of catarrh in the ox are similar to those producing the disease in the horse, such as exposure to cold, dampness, alternation of temperature, etc.

Symptoms.—The disease is ushered in with a chill; the muzzle is hot and dry, the horns may be cold or hot; there is a nasal discharge and other symptoms like those of the same disease in the horse.

Treatment is the same as that employed for the horse.

LARYNGITIS.

The disease among cattle is about the same as that of the horse. It presents similar symptoms, and requires similar treatment. The changes of the pulse and temperature are similar. In administering medicines to the cow, the dose should be a little larger than that used for the horse. Liniments to the throat should be much stronger than those prescribed for the horse, the skin of the ox being much thicker. .

PHARYNGITIS.

This disease in the ox is usually associated with laryngitis, constituting what is known as laryngo-pharyngitis. Causes, symptoms, and treatment are similar to laryngitis affecting the horse.

BRONCHITIS.

Inflammation of the mucous membrane lining the bronchial tubes. Causes are similar to those of the horse, exposure to cold, inhalations of smoke, etc.

Symptoms.—Wheezing, difficult breathing, husky cough, hide-bound, and a starring coat. The muzzle is dry and hot, and the pulse quickened. The cow lies down in this disease.

Treatment.—Place in a warm, ventilated place. Give nitrous æther, spirits ammo. arom., of each one ounce. Give one pound of sulphate of magnesia. Counter-irritants should be applied over the seat of the bronchial tubes and trachea. The ammoniacal liniment frequently referred to should be applied freely. Fly blisters may be necessary in some cases.

PNEUMONIA.

The causes which produce this disease in the cow are identical to those in the horse. The method of examining the lungs proves as effectual in the cow as in the horse. For information, see Pneumonia in the Horse. The muzzle of the cow becomes dry and hot, the breathing quickened, and the elbows are turned outward to a greater extent than is shown in the horse. The cow is able to lie on the sternum to a greater extent than the horse. There are other symptoms of this disease in the cow that are similar to those of the horse.

Treatment.—The treatment should be similar, but with larger doses. The skin being thicker than that of the horse, mustard plasters must be used to a greater extent. For pneumonia in the cow, a pound of epsom salts is admissible and beneficial.

PLEURISY.

This disease is similar to the same disease in the equine, and should be diagnosed and treated in a similar manner.

RED WATER.

This disease is also known by the name of bloody urine, black water, hæmaturia, etc. It is a disease peculiar to the bovine tribe, characterized by the emission of red, chocolate or black urine, containing albumen, and the coloring matter of the blood in a broken-down condition.

Causes.—The immediate causes of the disease are to be found in the nature of the food. Turnips, when given over-abundantly and without sufficient mixture of other food, will produce it. The disease is due also to insufficient feeding. It is always seen on pasture lands, and never in stall-fed animals, except when produced by turnips grown on damp lands. Red water prevails among calves, oxen, and bulls, and takes on an enzootic form in impoverished and woody pastures. It is seen most frequently on damp lands and in wet seasons.

Symptoms.—There is great prostration, febrile excitement, palpitation of the heart, a trembling pulse, pallor of the mucous membrane, and diarrhœa, succeeded by obstinate constipation. When following parturition, it is developed in from eight to fourteen days after, with general derangement, diarrhœa, and loss of milk. The pulse is quick, the back is arched. Constipation succeeds the diarrhœa, and the fæces passed are dark in color. Milk drawn from the cow prior to the attack is particularly disposed to froth in the pail, and may have a red settlement at the bottom after standing.

Treatment.—Good, nutritious food is the remedy. If this be given the disease will be arrested. The animal should be fed on eggs and milk. The chlorate of potash, in ounce doses, may be given. A pint of oil may be given, and strict attention should be paid to the diet.

XLII.

DISEASES OF THE STOMACH AND INTESTINES.

TYMPANITES.

Tympanites, or hoven, is a very common affection of cattle, caused by gaseous distention of the rumen or first stomach. The formation of gas is due to the character of the food, but may be due in some cases to functional derangement of the rumen. It occurs from choking and in connection with parturient fever. Frozen roots, or inferior food of any kind, will produce it. Clover is a very frequent cause of tympanites, when the animal is turned on the pasture while dew is on the grass or it is wet from rain. Feeding on kitchen refuse, slops, etc., is the most common cause in town cows.

Symptoms.—The animal shows an uneasiness, shifting from one set of limbs to another. The left flank is distended, and there may be eructations of grass. The animal grunts; saliva flows from the mouth. As the distention increases, the breathing is seriously interfered with; the animal persistently stands, and the tongue protrudes from the mouth. The animal falls, and, if not immediately relieved, will die in a few minutes. Death may result from rupture of the diaphragm or rumen, but usually results from asphyxia.

Treatment.—This should be undertaken at once. Oil of turpentine, three ounces; linseed oil, one pint, should be given in a drench, and followed by a pound of magnesia sulphate. Carbonate of ammonia, one-half ounce to one ounce, is good. Chlorinated lime, potassium chlorate, and carbonate of soda are excellent remedies. If seriously swollen and it becomes evident that death will take place before medicines can act, the animal should be tapped at the most distended part with the trocar. The

canula should be left in the rumen until all the gas escapes. The place to puncture is a span with the hand from the external angle of the ilium or point of the hip, downward and forwards, and the trocar should be entered downward and forwards. If the purgative has not been given, a pound of epsom salt should be administered. After the tapping, give stimulants and tonics.

VOMITION.

Vomition takes place in the ox, although rarely. The act is easily performed by them, but the reason that we seldom see it is due to the fact that these animals are not easily nauseated.

Fig. 132—Symptoms of Abdominal Pain.

The act of vomition is rarely performed by the horse, occurring only as symptoms of a grave lesion or disease. It is frequently seen just at the point of death. Cattle vomit when suffering from indigestion, during profound coma or apoplexy. I have seen it occur during severe cases of parturition. The dog, pig, and cat are easily nauseated and vomit very quickly.

IMPACTION OF THE RUMEN.

This is caused by an excessive quantity of food in the rumen. It may come on gradually, giving rise to no well-marked symptoms for several days. On tapping the distended part with the fingers, it reveals a dough-like feeling. The stomach pits on pressure, indicating a paralyzed condition of the coats of the rumen. If the patient be a milk cow, she will show a falling off in the quantity of milk. The muzzle becomes dry and hot, respiration quickened, and there will be a flow of saliva from the mouth. The rumen may become extremely distended, causing regurgitation of food. When the coat of the rumen is paralyzed, the operation of rumenotomy should be performed. It is performed by making an incision midway between the last rib and the spine of the ilium, and from four to five inches from the points of the transverse processes of the lumbar vertebræ. The incision should be made downwards and long enough to admit the hand. A handkerchief may be inserted in the wound in order to prevent the food falling into the peritoneal cavity. When this has been done, the food should be taken out with the hand, the parts then thoroughly cleaned, the incision in the stomach to be first stitched up with catgut sutures, the edges turned in, so as to get the peritoneal coat into position. The external coat may then be closed with strong silk or waxed twine

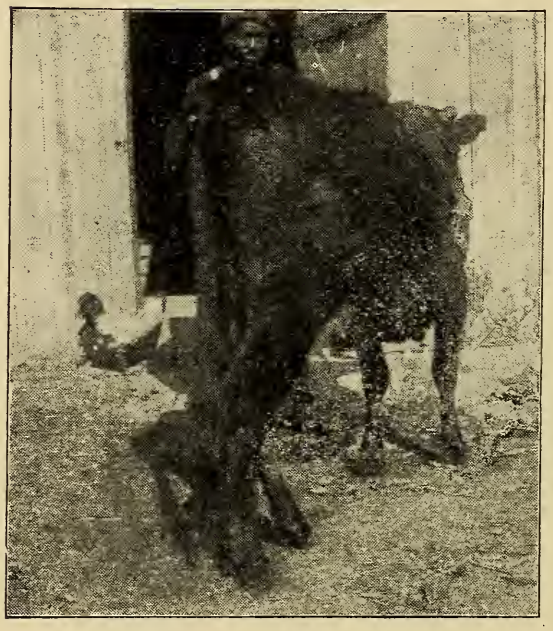


Fig. 133—Impaction of the Rumen.

and covered with a stiff pitch plaster. A pound of epsom salts should be administered, followed with iron sulphate, two drachms; powdered gentian, two drachms; powdered nux vomica, one drachm, twice a day. If the animal is entirely off feed, the medicines above may be given in the form of tincture in similar doses.

IMPACTION OF THE MANYPLIES.

This occurs generally as a symptom of disease in some other parts, or may occur as an independent disease. A dry, and even caked, condition of the manyplies does not prove conclusively that dryness of the food in the stomach caused death. Fevers and an inflammation of the different stomachs may cause impaction of the manyplies. It may occur from feeding on dry food and an insufficient quantity of water, or perhaps from inferior food.

Fig. 134—Impaction of the Manyplies.

Symptoms.—The animal is dull, refuses feed, the muzzle is dry and hot, the breathing increased; the animal grunts after each respiration, and the pulse is quickened. There will be more or less diarrhœa, followed by constipation. In many instances the animal strains violently and passes both blood and mucus.

Treatment.—Give a pound of epsom salts, half pound of table salt in a drench, and follow with laudanum, two ounces; alcohol, one ounce, every four hours. During convalescence the tonics should be made use of.

When cattle suffer with spasmodic colic, enteritis, dysentery, diarrhœa, etc., the nature, causes, symptoms, and treatment are similar to like cases in the horse.

WHITE SCOURS.

This form of diarrhœa is peculiar to young animals, and principally seen in little calves. It is due to inflammation of the true digestive stomach, and is generally caused from the mother's milk being either too rich or too poor. It is commonly seen in calves that get skimmed milk instead of the first milk of the cow.

Symptoms.—The patient lies down, stretches itself out, gets up, grates its teeth, stamps, curls the tail, and soon becomes very weak. The fæces are semi-fluid, whitish in appearance, with an offensive odor.

Treatment.—Give about three or four ounces of castor oil. If the pain is excessive, thirty drops of the tincture of opium should be combined with the oil. Lime water should be given, administered in the milk. Ten grains of pepsin, with five drops of hydrochloric acid, may be given, repeated as long as necessary.

PERITONITIS

This is an inflammation of the peritoneum, and has been previously described in the pages of this work. It is caused by exposure to cold, punctures, wounds, etc.

The animal stands a greater portion of the time; the pulse is from sixty to eighty beats per minute, wiry in character, and the mouth is hot. The breathing is quickened, the eyes reddened, and an intense fever is present. The animal turns his head wistfully to the flank, but does not roll.

Treatment.—If well-marked peritonitis occurs, it generally proves fatal. Tincture of aconite in twenty-drop doses may be used. In some cases stimulants are very beneficial. Opiates may be given to relieve pain. Mustard applications may be used externally to the abdomen. Blankets rung out of hot water and applied to the abdomen are very beneficial.

XLIII.

MISCELLANEOUS DISEASES OF CATTLE, NOT PREVIOUSLY REFERRED TO, THAT ARE DIFFERENT FROM THOSE OF THE HORSE.

PARTURIENT FEVER.

This disorder is commonly known as Milk Fever. It may occur in all animals, but it is most frequently seen in cows. It is characterized by greater or less febrile disturbance, rising temperature, and the various indications of fever.

Symptoms.—The animal becomes dull, the muzzle dry and hot, the pulse quickened, and the breathing is increased. This disease may occur in a light form or may be severe. The udder becomes hot and inflamed, and no milk is secreted. The animal shows thirst, and in severe cases refuses food.

Treatment.—Give one pound of epsom salts. Long-continued fomentations of hot water should be freely applied to the udder, and the patient milked eight or ten times a day. Two ounces of nitrous æther, with a half ounce of nitrate of potash, should be given two or three times a day for two or three days.

PARTURIENT PERITONITIS.

This condition is usually met with in cows, and is commonly caused by difficult parturition, and by the use of instruments, etc.; by long drives directly before or after parturition, or exposure to cold or wet weather during parturition.

Symptoms.—The cow becomes dull, the muzzle dry and hot, the pulse hard and wiry, the breathing short and painful, the bowels constipated, the urine scant and high in color, and there is a reddish-brown fluid discharge from the vagina. The patient

goes down and is unable to rise, groans heavily, and shows evidence of great pain. This disease is very fatal, and if extensive inflammation is present, death is the usual result.

TREATMENT.—Make a good, soft bed for the patient, and prop her up by placing supports for her to lean against. The place should be as quiet as possible. Drinking water should be offered frequently, but in small quantities. Enemas of warm water should be given three times a day. The vagina and uterus should also be injected with warm water, with a small quantity of

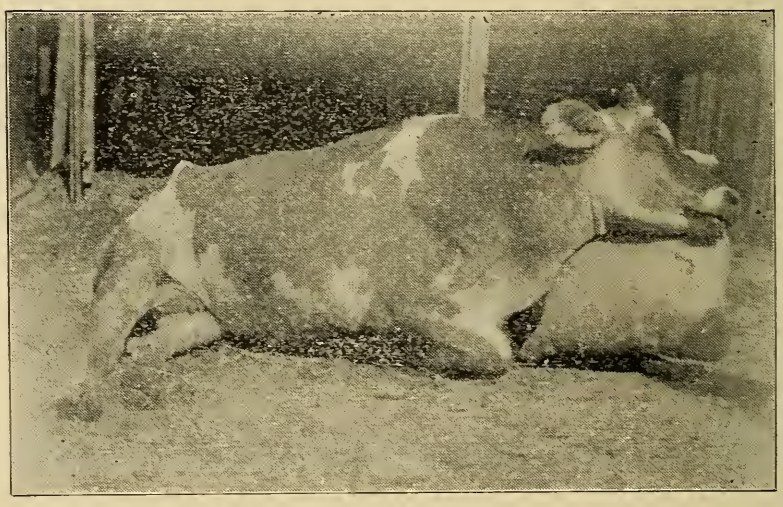


Fig. 135—Parturient Peritonitis.

opium added. A half pound of epsom salts should be administered, followed by tincture of opium, one ounce; aconite tincture, ten drops, every three hours. During convalescence, tonics should be given—iron sulphate, one-half ounce; powdered gentian, one-half ounce—twice a day in feed. Keep the body well clothed and change the position of the animal every three or four hours.

PATURIENT PARALYSIS.

Paralysis occasionally follows paturition, usually making its appearance within two or three days after the birth of the young animal, and is not a very serious condition.

SYMPTOMS.—The cow walks with a paddling gait, staggers and ultimately falls to the ground, and is unable to rise. It affects very little the secretion of milk.

TREATMENT.—Give a strong diffusible stimulant—alcohol, one ounce every four hours. Two ounces of sweet spirits of nitre may be used. Tincture of nux vomica should be given three times a day in drachm doses. Nux vomica should be used as long as any signs of paralysis remain. Where the condition persists for an unusual length of time, electricity may be used upon the parts

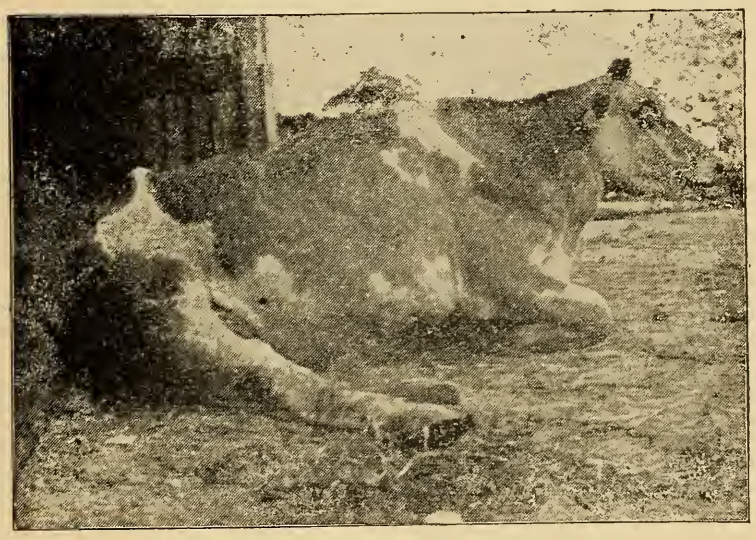


Fig. 136—Parturient Paralysis.

with benefit. The position of the patient should be changed every three hours. Liniments should be applied to the spinal column. A cloth spread along the spine and a hot smoothing iron passed over it until cold is beneficial.

PARTURIENT APOPLEXY.

This disease is peculiar to cows, and consists of a congested state of brain and spinal cord. It is one of the most serious and rapidly fatal diseases of cattle. It commonly attacks very deep milkers and those highly fed and in a plethoric condition. It usually occurs when a cow is six or seven years of age, and always

just after parturition, and generally at the birth of the second or third calf. It occurs where grasses are very fine, rarely being seen in badly-fed cattle. The disease runs its course in twelve to twenty-four hours.

Symptoms.—The animal suddenly becomes dull and hangs the head; as the disease develops, the patient shows uneasiness, resting first upon one set of limbs and then upon another. The flow

Fig. 137—Parturient Apoplexy.

of milk is greatly decreased, rumination ceases, and the cow ceases to notice her calf. On attempting to walk, she moves with a paddling gait, breathes heavily, and the respirations quicken. She soon falls heavily to the ground, and, becoming excited, makes great effort to regain her feet; but in a very short time becomes comatose, with head drawn around to the side. If the head be straightened and then freed, it will immediately return to the side with a thump. This is the diagnostic symptom of the disease. The eyes are now amaurotic and the cornea devoid of sensibility. The breathing at times is scarcely perceptible; at other times of stertorous character. The urine at this stage ceases to pass, the bowels do not act, and tympanites appears.

Treatment.—Give a pound of epsom salts as quickly as possible, with enemas of tepid water. If down, the patient should be kept propped up on her sternum, with a support for her head. Her position must be changed every two hours. I have always had good results from the use of ice to the head. The blood that should go to make milk is thrown back upon the system, thus producing a congested state of the brain. Blisters or strong liniments should be applied to the spine. If tympanites sets in, the trochar and canula should be used to relieve the condition. Hand-rubbing the body is beneficial. The cow should be milked every two hours, and be protected from the sun in the summer and from cold in the winter. The urine should be removed from the bladder by the catheter. Nitrous æther, two ounces; belladonna tincture, one drachm, should be given every four hours. Half-ounce doses of the bromide of potash should accompany every other dose.

MAMMITIS.

Inflammation of the mammary glands is usually found in the cow, but is met with occasionally in all females. It occurs in two forms—an inflammation of the superior structure of the glands and an inflammation of the interior of the glands. It may affect a single gland, or all the glands may be involved in the inflammatory process.

Causes.—It is frequently due to an injury caused by briers, brush, or wounds inflicted from any cause. Poisonous weeds or stings from insects may cause it. A change in temperature or a change in the animal's condition may produce it. It is often caused by neglecting to completely empty the udder at each milking.

Symptoms.—There will be a straddling gait if the whole gland is inflamed. If but a portion of the gland is inflamed, the animal will be lame in the limb next to the inflamed part. The glands will be swollen, hard, and tender to the touch. A well-marked fever is present, the muzzle is dry and hot, and the breathing is

affected. The patient usually has a chill at the beginning of the disease, is thirsty, with appetite impaired. The bowels are constipated and the urine high in color. The milk in the glands becomes clotted, and may be mixed with blood, or even pus, and possesses a fetid odor. At this stage, destruction of a portion or whole of the gland may be expected. In cases terminating favorably, a full flow of milk cannot be expected from the gland until the animal has her next calf.

TREATMENT.—Give one pound of epsom salts. A suspensory bandage is of the greatest importance. Holes should be made in

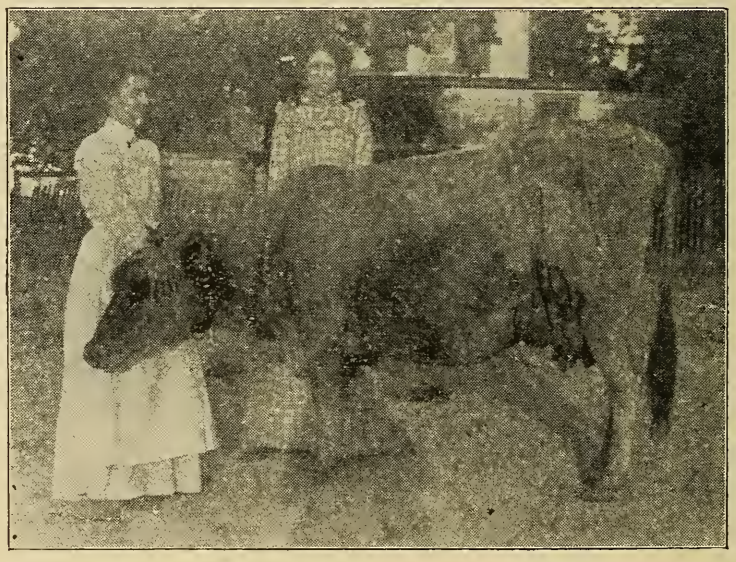


Fig. 138—Mammitis.

the bandage for the teats to go through, and the bandage fastened over the back. The gland should rest upon the bandage, packed with bran and hops, which should be kept moist by constantly pouring warm water upon them. The patient should be kept warmly clothed, and an ounce of alcohol should be administered three times a day. The cow should be milked a dozen times a day. The bumps or clots by this means may be broken down and forced out of the gland. If the milk will run, a milk syphon may be used and allowed to remain in. In case of suppuration,

the parts must be opened to allow the pus to escape freely. The parts should then be treated as an ordinary wound. Belladonna paste is a very good application to the gland for relieving pain.

ENTERITIS AND COLIC.

These diseases are not frequent in the cow. The causes, symptoms, and treatment are similar to those of the horse. The

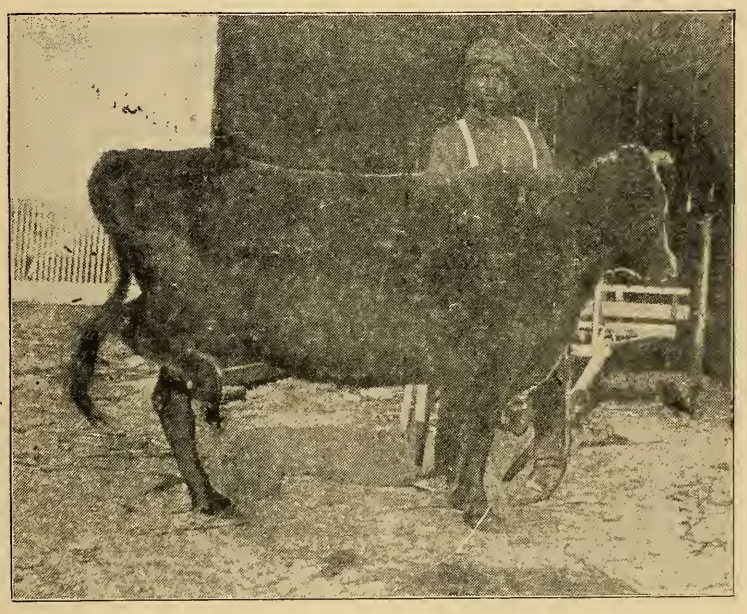


Fig. 139—Enteritis, or Inflammation of Bowels.

cow does not roll in expressing abdominal pain, but stamps and kicks at the abdomen.

Wounds, fractures, diseases of bones and joints are similar to those of the horse.

STRICTURE OF THE TEAT.

This condition is due to inflammation of the gland. The milk flows in a small stream.

Treatment.—The stricture should be divided by the concealed bistory, and the cow milked four or five times a day to prevent the parts adhering. This condition should be entrusted to a competent surgeon.

WARTS.

These occur both on the outside and the inside of the teats. If outside, calamine ointment will be the best remedy for removing it. If inside, the concealed bistory should be used to remove it. A calculi or milk stone is sometimes found in the teats. They can usually be removed by gentle manipulation.

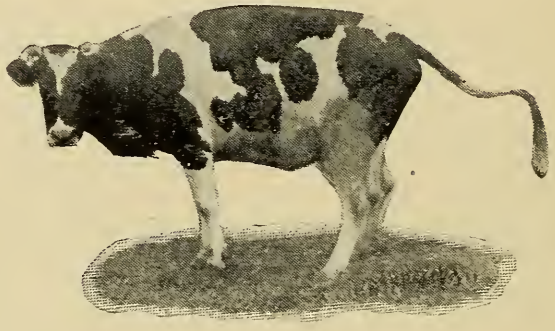


Fig. 140—Metritis.

Diseases of the eyes of cattle are similar to those of the horse, except that the cow does not have the disease known as constitutional opthalmia. For treatment, see Diseases of the Horse.

Skin diseases of the cow are not numerous. For treatment, see Skin Diseases of the Horse.

HOOF EVIL.

This is a disease usually confined between the two claws. The treatment is similar to that for thrush in the horse.

METRITIS.

Causes, symptoms, and treatment are similar to the same disease in the mare.

XLIV.

PARASITES AFFECTING CATTLE.

Parasites very seldom trouble cattle. A tapeworm known by the name tænia expansa sometimes affects cattle. It does not cause much harm. They are found in the intestines, and sometimes fifteen feet in length.

Treatment.—Give male shield fern, one ounce, with oil. An ounce of areca nut, in oil, may also be tried. Turpentine, three ounces in oil, may be given with good results in some cases.

CYSTICERCUS BOVIS.

This parasite is the cause of measles in cattle. It lives in the muscles of the ox, may be found in the pteragoid muscle in the heart and in the diaphragm.

Life History.—If the parasites be eaten and taken into the stomach, they then separate and locate in the intestines of man. They are then passed from the man, and the ox takes in the eggs and they find their way into the muscles.

Symptoms not well defined. No treatment.

FASCIOLA HEPATICA.

This is a round worm. It is the cause of rot in the liver of sheep. The disease is found along rivers, when they overflow.

Symptoms.—The only symptom noticed is the sudden loss of flesh after rapid improvement for a month or two.

Treatment.—Putting the animal on other pastures, on high land, if possible, is about all that can be done.

STRONGYLUS MICRURUS.

These parasites generally become encysted in the lung tissue. Young animals are affected much more commonly than adults.

The ovum gains access to the stomach during the process of feeding. It is there set free, enters the circulation, and is carried to its favorite habitation. The disease prevails on both sides of Lake Erie, in the State of Ohio, and in the Dominion of Canada. It is frequently seen in Virginia, and throughout the low-lying districts.

Symptoms.—The animal has a husky cough, which increases in frequency and severity by exertion. The appetite is impaired, and there is a discharge from the nostrils. The parasites may be detected by the naked eye, if the discharge be closely examined.

Treatment.—Change the animals to a higher and dryer pasture, if possible. Turpentine, one ounce; linseed oil, eight ounces, should be given in a drench. Inhalation of chlorine gas will destroy the parasites. Place three or four of the affected animals in a loose box; the chlorine gas may be generated by pouring sulphuric acid over a mixture of sodium chloride and magnesium black oxide. When the animals begin to cough they should be liberated. Inhalation of burning sulphur in a close stable is a very safe and effectual remedy.

SHEEP.

XLV.

CONTAGIOUS DISEASES OF SHEEP.

VARIOLA OVINAE (Sheep-Pox)

Is a contagious and infectious eruptive disease, analogous to small-pox and cow-pox. This disease has caused great loss to sheep-owners in Britain as well as in other countries. It occurs in two forms, malignant and benign. The malignant form never produces vesicles; the sheep lose their eyes, the wool falls out, the skin cracks, and the nostrils are filled with a fetid discharge. In the benign form, vesicles appear; their scabs falling off, leave pits on which the wool never grows again.

Symptoms.—The period of incubation is about fifteen days. As in all fevers, there is a rise in temperature, and in this it is well marked, rising as high as 107 or 108. Soon little papulæ or nodules, deeply imbedded in the dermis, having a florid red aspect, make their appearance. They are first seen on the sides of the anus and thighs, and on the cheeks and lips, causing the skin to have a flea-bitten appearance. The papula gradually enlarges in size, then becomes elevated and transparent in the center. The papula is now a vesicle containing a liquid, at first transparent, then turbid; ultimately it becomes dry, hardens into a crust, and is cast off with the epidermis.

The affected animals separate from their fellows; their heads hang low; the breathing is quick and short; the eyelids swollen, the conjunctiva reddened; a discharge of mucus from the nostrils; yellow spots appear on the pituitary membrane; the pulse is quick and wiry; rumination is suspended; food is refused and there is great thirst for water. The feet and ears are usually cold, while the surface of the body is hot. These symptoms are shown from the commencement of the eruption, and do not abate

until the papular stage gives place to the vesicular. When the vesicular stage is reached the animal is relieved.

Usually half the sheep attacked with this disease succumb. In some cases nearly the whole flock is swept away.

TREATMENT.—Medicinal remedies are of no service. The disease must be allowed to run its course. Sweet spirits of nitre, one-half ounce; potassium nitrate, one drachm, may be used and the nostrils sponged to prevent suffocation. The diseased sheep should be separated from the healthy. If possible, this should be done while the fever is rising and before the commencement of the eruptions. If this be done, the disease may be checked. The healthy animals should not be allowed to go on pastures or roads frequented by diseased animals until heavy rains have destroyed the contagium.

RINDERPEST.

This disease occurs in sheep, although not so frequently as in cattle. The symptoms are the same in sheep as rinderpest, or cattle plague, in the ox. The incubative stage is more variable than in cattle. Sheep running with cattle that have rinderpest generally contract the disease.

ANTHRAX.

This disease occurs in sheep, but not so frequently as in cattle and horses. When affecting sheep, it is sometimes called splenic apoplexy.

SYMPTOMS.—The first symptom exhibited by a sheep thus affected is a short step. The animals are seen to lie down and rise frequently, or stand apart with the head depressed and the back arched. Should the disease not terminate rapidly the wool will drop out. The post-morten appearances are identical with those seen in cattle.

FOOT ROT.

This is the name given to a contagious disease in sheep, which causes a destruction of the horn of the foot. It is asserted by

some to be non-contagious, but I think there can be no doubt that the disease is contagious.

Symptoms.—There may be swelling of the inter-digital tissues, or there may be an inflammation of the sole at the end of the toes. An alteration of the horn takes place, and there is a discharge of fetid ichorous fluid from the parts. Fungoid growths appear on the exposed surface. The disease burrows under the horn of the inner wall of the claws and separates it from the sensitive structures within. As the disease advances the animal loses flesh. In some cases the sensitive structures of the affected feet are separated from the horny walls, the wall becoming entirely detached. The horny sole crumbles away also, leaving the sensitive structures exposed, which soon sprout with masses of fungoid growths. The animal, unable to put its lame foot to the ground, will crawl on its knees if the forefeet are affected, and upon its abdomen if the hind ones be the seat of the disease. The disease generally attacks one foot and then passes to the others. It is generally seen on hill farms during the months of August and September.

Prevention.—Remove the sheep, if possible, to another pasture, after making them walk through a long trough containing an ounce of carbolic acid, two drachms of corrosive sublimate, to each quart of water. They should be made to walk through this solution once a week.

It may be necessary to drive them through a solution of sulphate of copper. One pound of arsenic to five gallons of water may be used in the same way. In some cases it may be necessary to touch the fungoid growths with nitric acid.

LOUPING ILL.

This disease entails an enormous loss in some countries among hill sheep of both the white and black faced breeds. It prevails to a considerable extent in Scotland. The disease is due to the tick, a true blood-sucking parasite, belonging to the family of ixodidæ. The mouth of the tick is provided with a serrated beak,

or rostrum, which enables it to pierce the skin and retain its hold very firmly and almost without effort, as the barbed serrations point backwards. Ticks are found on old grasses where the last, or previous, year's grasses are rank, affording cover for the parasites. They attack animals by plunging their beaks deeply into the skin, particularly about the face, root of the ears, lower part of breast, between the thighs, or in parts of the body most exposed. They will hang for days, sucking the blood, until their bodies become distended to eight or ten times the original size. They seem not to quit their hold until they die.

Symptoms.—The animal trembles. There will be a spasmodic contraction of the muscles, especially those of the upper part of the neck. There will also be spasms of the muscles of the limbs, causing the animal to walk stiffly and jerk the feet in peculiar manner. The breathing is quick, the pulse 102 to 103, and the temperature 105 to 106. The head and neck are distended as in lockjaw, the animal trembles, and ultimately becomes paralyzed.

Treatment.—The ticks should be destroyed, because through them the micro-organisms are communicated to the sheep. It has been proven that the ticks contain the spores, and are capable of infecting sheep.

They must not be pulled off. Their bodies should be clipped in two with scissors; they will then immediately retract the sucking organ and fall off. A strong decoction of tobacco, saturated with salt, will remove them, and they are also quickly destroyed by turpentine. An ounce of creosote to four of linseed oil is recommended, and dipping with any of the recognized sheep dips will destroy them.

The old grasses in which they stay should be cut down or ploughed under.

XLVI.

ENTOZOA OF THE SHEEP.

Sheep are infested with four varieties of tapeworms. A tapeworm consists of a head and several joints, or suckers. The suckers and hooks hold on to the mucous membrane of the intestines. They multiply by the lengthening of the neck. The head has four suckers. They have no generative organs, no mouth, nor digestive organs, but live by absorption of nourishment through pores. Each segment may come off from the rest.

TAENIA COENURUS.

This parasite infests the intestines of the dog, from which perfect segments are expelled. These segments falling in the pasture where sheep are feeding, are swallowed with the herbage; getting into the blood vessels, they are carried to every part of the body, and are lodged in the brain. Here the young embryo covers itself. It is then the size of a mustard seed, and gradually grows. This parasite causes the disease in sheep known as sturdy turnsick or gid. The parasite encysts itself in the brain, the cyst measuring in diameter one-half inch to a hen's egg. Usually but one cyst is found. They generally attack lambs under one year old; sheep above two years old being rarely affected. The ailment prevails largely in flocks where dogs are employed to assist the shepherds. On enclosed pastures, where the sheep are unattended by dogs, the disease seldom occurs.

Symptoms.—The animal becomes dull and stupid. If made to go on, he may dash into the wall or fence, turning to the right or left, as controlled by the hemisphere of the brain in which the parasite is located. When the parasite is lodged between the hemispheres, the animal steps high and goes forward in a straight line; the head is carried upwards, and there may be a varying

degree of amaurosis in one or both eyes. Sometimes the animal becomes blind and deaf. When the parasite is lodged in the cerebellum, the animal's movements are performed without control. The head is elevated; the limbs are moved automatically; one or two steps are taken forward, when the animal starts with a bound, but immediately falls and is unable to rise for a time.

PREVENTION.—The dogs should be treated to prevent the trouble in sheep.

TAENIA MARGINATA.

This is very common on this continent, being frequently seen in the Western States. It is found in the mucous membrane, peritoneum, or liver. The life history is the same as that of the tænia cœnurus. The parasites generally perish in the liver. They in some cases cause inflammation of the peritoneum.

No treatment.

TAENIA EXPANSA.

This parasite does not cause much harm. They may be fifteen inches in length, and are found in the intestines.

TREATMENT.—Male shield fern, one to two drachms in oil, may be given. Areca nut, one to two drachms in oil, or turpentine, three to four drachms, are all good remedies.

DISTOMATA HEPATICA.

This parasite destroys the liver of sheep, producing the disease known as "rot," which has caused great losses to sheep-owners throughout England. It prevails on low, marshy lands and during wet seasons. The disease may be detected in the spring, when ewes are dropping their lambs. A sound ewe, in good order, drops a lamb covered with a thick and yellow slime; when the slime is white, thin, and watery, the sheep is not in a healthy condition. Another method by which healthy sheep may be known is by rubbing the flesh backwards and forward between the fingers and thumb, at the ends of the short ribs. If the flesh is solid and firm, she may be considered sound; if found soft

and flabby, with a sort of crackling sound and a watery or blubbery feeling, they are unsound. Professor Simonds states that a dry, scaly state of the skin on the inner part of the thighs, particularly where it is uncovered with either wool or hair, is early recognized as a sign, and that an examination of the eye will materially assist in determining the question of disease. If diseased, the vessels of the eye are tinged with a pale or yellowish colored blood.

The progress of the rot is slow. The animal becomes dull, the mucous membranes become pale, skin is dry, the flanks hollow, back weak, the belly tucked up. The eyes become yellow, and dropsical swelling is seen in various parts of the body.

Treatment.—The unsound pastures should be abandoned. The sheep may be moved to dry pastures and an abundant supply of salt given.

OESOPHAGOSTOMA.

This parasite shows itself by the formation of little tumors or nodules in the mesentery and intestines, resembling tubercular deposits. In the tumor will be found little round worms. The male is less than a half inch; the female is three inches in length.

Symptoms.—The symptoms are not well shown. A sheep should be killed in order to find out the nature of the disease.

STRONGYLUS FILARIA.

This parasite affects cattle also. They are located and lay their eggs in the bronchial tubes. The male parasite is from one to two inches; the female from two to three inches in length.

Symptoms.—Cough, difficult breathing, and panting. Shreds of mucus may be passed up. The animals may have a fair appetite, and if they live over winter the parasites will disappear.

Treatment—Preventive.—It will be some time before the sheep can be put upon the land, and they should be fed well.

Medicinal Treatment.—Give one to two drachms of turpentine, in oil, and inhalations of sulphur. The sheep should be con-

fined in a close stable, where they may be compelled to inhale the fumes of burning sulphur. This treatment should be continued once a day for three or four days. Oil of turpentine, one to two drachms; chloroform, one-half drachm; carbolic acid, ten minims, may be injected in the trachea, hypodermically, every day for three or four days.

Sheep suffer from the various sporadic diseases to which the cow and horse are subject. Their causes, symptoms, and treatment may be found under Diseases of Cattle and Horses. The dose for the sheep is about one-fourth of that for the horse.

SWINE.

XLVII.

CONTAGIOUS DISEASES OF SWINE.

SWINE PLAGUE.

This disease, commonly known as "hog cholera," is a disease peculiar to swine. It is highly contagious and infectious, and extremely fatal, especially among young animals. It seems to prefer in its attack large herds, and is always more fatal where animals are crowded together. Some individual animals seem more predisposed than others. The morbid process, although in all cases essentially the same, is not restricted to a single part or organ, or to a set of organs, but has its seat in almost all parts of the body. The period of incubation after inoculation is about five days.

Symptoms.—The first symptom noticed is shivering, lasting from a few minutes to several hours, frequent sneezing, and more or less cough. The temperature is greatly elevated, in some cases reaching 111° F. These symptoms are followed by loss of appetite, a rough appearance of the coat, dropping of the ears, loss of vivacity, attempts to vomit, a tendency to root in the bedding, and to lie down in a dark and quiet corner; watery eyes, swelling of the head, eruptions on the ears and other parts of the body; bleeding from the nose, swelling of the eyelids; dizziness, blindness, labored breathing, constipation, or, in some cases, diarrhœa. There will be rapid emaciation and a gaunt appearance of the flanks; an appetite for dirt, an increased thirst, and a copious discharge from the nose. The peculiar, offensive, and fetid odor of the exhalations and of the excrements may be considered as characteristic of the disease. If the animals are costive the fæces are grayish or brownish black and hard; if diarrhœa is present the fæces are of a grayish-green color, and

contain in some cases an admixture of blood. In a large number of cases red spots are seen between the hind legs, behind the ears, and on the nose and neck. Toward a fatal termination of the disease, this redness changes frequently to purple. As the disease progresses the animal becomes weaker, and there is lameness in the hind leg. The animal, when standing, carries the head near the ground. As the fatal termination approaches, there will be fetid diarrhœa, taking place of costiveness. The voice becomes faint and hoarse, and the animal is unconscious; the skin becomes wrinkled and dry, with a cold, clammy sweat. In those few cases in which the disease has not a fatal termination, the symptoms above enumerated gradually subside. The hacking cough remains for a long time.

MORBID ANATOMY.

A more or less hepatization of the lung, so extensive in some cases that a portion of the lung will sink like a rock in water. The lymphatic glands are enlarged, as also the mesenteric glands. In some cases they present even a brownish or blackish color. Numerous *bacilli suis* are found in these parts and in the lung. The trachea contains a frothy mucus; its mucous membrane congested and swollen. The pleura and pericardium contain a straw-colored serum. The heart is more or less congested; is flabby and dark in appearance, owing to the engorgement of its blood vessels. Tumors or morbid growths appear on the mucous membrane of the intestines, varying in size from that of a pin's head to a pigeon's egg. They are of a grayish-black color. These tumors contain innumerable *bacilli suis*, and are found throughout the intestines. Tumors may now and then be seen on the mucous membrane of the gall, bladder, stomach, and uterus. Slight changes appear in the liver, pancreas, and spleen. Morbid changes are sometimes seen on the mucous membrane of the eye, the lower jaw, and in the skin. Numerous small growths develop, extending but slightly into the cutis, but causing a complete degeneration of the epidermis, and leaving behind, if re-

moved, an uneven raw surface. In some cases they are so numerous between the legs and behind the ears as to produce a sloughing of the whole skin. Red or purple spots and patches are found in the skin, on the under surface of the body, behind the ears, and between the legs. The blood becomes altered and reduced in quantity, is of a dark color, and coagulates very readily when exposed to air. The blood examined microscopically will be seen to contain large numbers of the *bacilli suis*.

Measures to Arrest the Disease.—To effectually stamp out the disease, congressional legislation is necessary. One farmer may successfully eradicate it from his own herds, but so long as his neighbor's continue to harbor it, his stock is daily subjected to the danger of renewed infection. His personal sacrifice is all in vain so long as his neighbors' hogs are dying. Animals are only safe from infection at a distance of one mile, and a strong wind will carry the disease from farm to farm. When hog cholera breaks out in a community the hogs are too often shipped to market, thus disseminating the disease.

Every sick hog should be destroyed, immediately buried or burnt, and the premises should be disinfected. If this be done the disease may be stamped out in a short time. If this cannot be done, the diseased herd should be isolated and their pens disinfected. The healthy animals on the same farm should be kept in movable pens on high and dry ground. The pens should be moved each day to a new spot. These pens could be made with a few planks. The troughs should be kept clean and the water pure. The healthy animals should not be waited on by those that attend the diseased animals.

Therapeutically, but little can be done to prevent an outbreak. Carbolic acid may be used to disinfect the premises, and it may be given internally in the drinking water, every morning and evening, in doses of from ten to twenty drops. Chloride of lime is also a good disinfectant for use in the pen. A solution of carbolic acid and water may be sprinkled over the hogs once a day.

TREATMENT.—A cure for this disease has never been found. The advertised specifics are worthless. No cure has ever been found for glanders, cattle plague, and anthrax.

ANTHRAX.

The varieties in the pig are reduced to anthrax fever, gloss anthrax, and anthrax with tumor. This disease is generally produced in the hog when allowed to run in pastures where cattle are dying from anthrax, or from eating flesh of other animals that have died of the malady.

Anthrax fever is rapidly fatal in the pig, killing without previous manifestations of sickness. In mild cases there will be sudden prostration, hanging ears, arched back, sullen appearance, vomition of a coffee-colored fluid, continual convulsions, paralysis of the extremities, rapid alteration of heat in the body, highly injected mucous membrane, followed by death.

GLOSS ANTHRAX.—In this form there is great swelling of the throat, pharynx, larynx, and tongue. The parts become gangrenous, an exhaustive diarrhœa sets in, accompanied with a discharge of blood, and speedy death.

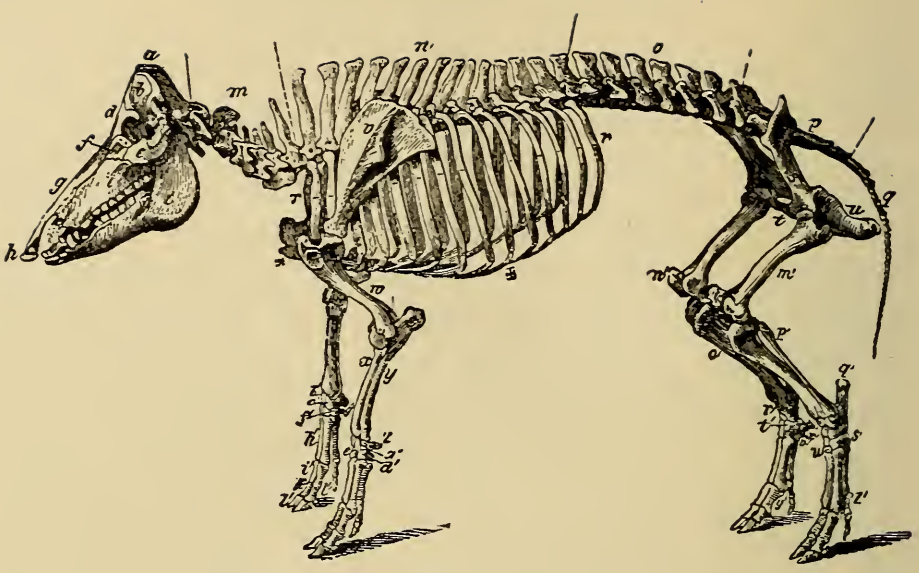
Anthrax with tumor is rare in the pig. When it does occur, the tumors form below the parotid gland on each side and between the lower jaw and wind-pipe. The tumors are very painful to the touch. There is no treatment for this disease when it occurs in the hog. It rarely occurs in this country, but is prevalent in India and Africa. In India it is termed "Loodiana Disease" in Africa "Horse Sickness."

TUBERCULOSIS.

This disease is not often found in swine, but they are not exempt. They generally contract the disease by drinking milk from tuberculous cows. The animal will present all symptoms of tuberculosis as shown in other animals. For further information on tuberculosis, see chapter on this subject under Diseases of Cattle.

SPORADIC DISEASES OF HOGS.

The hog in his natural state is almost free from disease. His power to resist disease has been greatly lessened by continual close breeding and improper treatment. An injudicious practice of crossing has been carried to such an extent as to almost obliterate traces of the original breed. An attempt has been made to improve upon nature, to make a permanent stock that will reproduce itself, which has proven a failure. All hogs belong to one great family, and it is a law of nature that, where great divergence has taken place from any parent stock, a tendency to revert prevails. However, if a judicious system of crossing be practiced, certain breeds may be improved. The male may be selected carefully from some special breed, as Poland China, and crossed with an opposite breed in shape and habits, as the Essex. In-breeding is often practiced through an effort to obtain a perfectly pure breed of any particular species. Hogs bred in such a manner are predisposed to diseases of every sort. The custom of breeding from sows too young is a predisposing cause of disease. The sow should not be allowed to become pregnant until one year old. Before that time she is growing and immature. The results of breeding young sows and in-breeding are loss of vitality and scrofulous degeneracy. This is well exemplified in herds when cholera is raging.



SKELETON OF THE HOG (OMNIVORA).

AXIAL SKELETON.

THE SKULL.

Cranial Bones.—*a*, Occipital, 1; *b*, Parietal, 2; *d*, Frontal, 2; *c*, Temporal, 2; Sphenoid, 1; Ethmoid, 1; Auditory ossicles, 8.

Facial Bones.—*g*, Nasal, 2; *h*, Os rostri, 1; *f*, Lachrymal, 2; *e*, Malar, 2; *i*, Maxilla, 2; *k*, Pre-maxilla, 2; *l*, Inferior maxilla, 1; Palatine, 2; Pterygoid, 2; Vomer, 1; Turbinals, 4; Hyoid (segments), 5. Teeth—Incisors, 12; Canines, 4; Molars, 28.

The Trunk.—*m*, Cervicle vertebræ, 7; *n*, Dorsal vertebræ, 14; *o*, Lumbar vertebræ, 7; *p*, Sacrum (four segments), 1; *q*, Coccygeal vertebræ (variable), 18; *r r*, Ribs, 28; * Sternum (seven sternebræ), 1; ⁘ Costal cartilages.

APPENDICULAR SKELETON.

PECTORAL LIMB.

v, Scapula, 2; *w*, Humerus, 2; *x*, Radius, 2; *y*, Ulna, 2. Carpus—*z*, Trapezium, 2; *a'*, Cuneiform, 2; *b'*, Lunar, 2; *c'*, Scaphoid, 2; *d'*, Unciform, 2; *e'*, Magnum, 2; *f'*, Trapezoid. 2; *g'*, Pisiform, 2. Metacarpus—*h'*, Bones, 8; Large sesamoids, 16. Digit—*i'*, Proximal phalanges, 8; *k'*, Mesian phalanges, 8; *l'*, Distal phalanges, 8; *l''*, Small sesamoids, 8.

PELVIC LIMB.

Pelvis.—Os Innominatum—*s*, Ilium, 2; *t*, Pubis, 2; *u*, Ischium, 2.

The Limb.—*m'*, Femur, 2; *n'*, Patella, 2; *o'*, Tibia, 2; *p'*, Fibula, 2. Tarsus—*q'*, Calcaneum, 3; *r'*, Astragalus, 2; *s'*, Cuboid, 2; *t'*, Cuneiforme magnum, 2; *u'*, Ecto,cuneiforme, 2; *v' w'*, Meso- and Endo-cuneiformes, 4. Metatarsus—Large bones, 8; *x'*, Small bones, 2; *y'*, Large sesamoids, 16. Digit—Proximal phalanges, 8; Mesian phalanges, 8; Distal phalanges, 8; small sesamolds, 8.

VISCERAL SKELETON.

None.

The separate bones of the Skeleton of the Hog, as here considered, are 324.

XLVIII.

DISEASES OF THE RESPIRATORY SYSTEM.

PNEUMONIA.

This sometimes occurs in hogs, and the causes are similar to those producing the disease in other animals, as sudden alterations in temperature, exposure, etc. It is produced sometimes by using a close pen, with an adjoining unprotected inclosure for the animals to run in. The change from the close pen into the open air, with no protection from the wind, results in colds and pneumonia. An animal taken from a warm pen and turned on pasture, with no protection at night, will sometimes suffer with colds and lung troubles.

Symptoms.—The animal stands or sits up most of the time; there is an elevation in temperature; the pulse is increased, with increased respirations; there is a frequent cough; the limbs become cold; the animal stands with the back arched and the nose low to the ground. Auscultation and percussion are of little aid in the diagnosis of lung disease in the hog.

Treatment.—Tincture of aconite, in from five to ten drop doses, should be used. If the animal shows great weakness, with a weak pulse, a drachm of alcohol should be given three times a day. Nitrate of potash, dissolved in the drinking water, is beneficial. If the animal will not take it in the drinking water, drachm doses should be given along with the drench. Milk should be given as soon as the appetite returns, and finally stronger food may be given. Mustard should be applied to the lungs.

The hog may have bronchitis, laryngitis, trachitis, etc. The causes, symptoms, and treatment are similar to those of the same diseases in other animals. The dose for the hog is about one-eighth that of the horse.

XLIX.

DISEASES OF THE DIGESTIVE ORGANS.

The hog frequently suffers with diseases of the digestive organs. He is an omnivorous animal, eating both animal and vegetable food; his instinct demands and his health requires such food. In his native state, he obtains animal food by digging worms with his nose. The improved methods of swine breeding have proclaimed the nose of the hog a useless appendage. He is deprived of his natural method of obtaining food by putting a ring in his nose. Thus deprived of the natural means of obtaining a supply of animal food, he is forced to subsist almost exclusively upon vegetable diet, consisting mostly of corn. In the corn-growing and hog-growing districts, the only food received from birth to slaughter is corn. Where this diet is used, hogs frequently suffer with troubles of the digestive organs.

The symptoms of stomach and bowel troubles are a refusal of food; the hog stands and hangs the head low to the ground, stamps the feet, especially the hind ones, or he may lie down most of the time. The ears are dropped, the face indicates pain, the forehead having a wrinkled appearance. The tongue is generally white and flabby, especially when the stomach is affected. If the tongue is narrow, red, and contracted, it shows that the stomach requires acids. Slight tympanites may be present, which may be detected by tapping on the abdomen when the hog is lying down. The animal may vomit in some cases.

Treatment.—Give one drachm of aloes, or, for the same purpose, four ounces of epsom salts may be used. To relieve pain, the following remedies may be used: Tincture of opium, two drachms; sweet spirits of nitre, one drachm; water, a half pint,

every four hours. Enemas should be administered. If gas is present, a half ounce of turpentine may be substituted for the nitre in the above drench. Bicarbonate of soda, in half-drachm doses, may be given, and is an excellent remedy.

CONSTIPATION.

This condition is frequently seen in hogs. Two or three of a herd may cease to eat. They will wander off, and at feeding time will not come up. Repeated and ineffectual efforts to pass fæces are observed.

TREATMENT.—Give four ounces of epsom salts and administer enema.

The hog may suffer with the various diseases of the digestive canal. The causes, symptoms, and treatment are similar to those of the same disease in the horse.

L.

NERVOUS DISEASES OF THE HOG.

ENCEPHALITIS.

The pig sometimes suffers with inflammation of the brain. This occurs most frequently when running in pastures where the grass is over-ripe. It may also arise from the effects of some narcotic agent, or may be produced by tumors or abscesses forming in the brain.

Symptoms.—There will be marked dullness, increasing as the disease progresses. The animal is excited by noise, the urine is scant, and the bowels constipated. The pulse falls below normal. The respirations are slow and usually stertorous in character. The animal when standing hangs the head or rests the nose on the ground; staggers, falls, and ultimately is unable to rise.

Treatment.—But little can be done in this case. One drachm of aloes should be administered. Twenty grains of the bromide of potassium may be used. Belladonna tincture, in five-minim doses, is an excellent remedy for inflammation of the brain in hogs.

EPILEPSY.

This sometimes occurs in hogs, and is due to intestinal derangement, such as worms, etc.

Symptoms.—The patient gives way behind, begins champing the jaws, froths at the mouth, and there is spasmodic jerking of the head. The head is gradually raised as the fit comes on, and finally the hog falls backwards on the ground, the attack lasting for three or four minutes; after which he arises, and is apparently well again.

TREATMENT.—Give one drachm of aloes, and follow with ten-grain doses of potassium bromide. An endeavor should be made to remove the cause.

For other nervous diseases in the hog, see Nervous Diseases of the Horse.

LI.

PARASITES OF THE HOG.

STRONGYLUS ELONGATUS.

This parasite is located in the lungs of hogs. They are generally found in the terminal part of the main bronchium in the posterior lobe of one or both lungs. Other air tubes are occasionally infested. The male is eight to nine inches in length, the female one to one and a half. They have curled tails. Pigs infested by these worms thrive badly, and may die.

Treatment.—These parasites may be destroyed by placing the herd in a close pen and compelling them to inhale the fumes of burning sulphur once a day for three days. When the hogs begin coughing they may be released.

TRICOCEPHALUS DISPAI—WHIP WORMS OF SWINE.

These are found in large numbers in the intestines, the cæcum, and colon. This worm is characterized by a long, delicate, anterior part of the body, and a short, thick, posterior portion. The male is about one and a half inches long, and is curved in a spiral. The female is one and a half to two inches in length. When these worms are present, they may cause an inflammation of the large intestines, with costiveness or diarrhœa and a rapidly advancing bloodlessness.

Treatment.—Give a half ounce of the oil of turpentine, and continue the treatment once a day for six or seven days.

SCLEROSTOMUM DENTATUM.

This is another small worm of the cæcum and colon in hogs. It is only about one-third to one-half inch in length. They fix

themselves to the mucous membrane of the intestine, penetrate the tissue with their sharp teeth, and live upon the blood.

Symptoms.—If present in large numbers the hog becomes pale and bloodless, with rapid loss of condition and anæma. There will be an irritation of the bowels, followed by constipation or diarrhœa.

Treatment.—Give half-ounce doses of turpentine. Santonine, in ten-grain doses, will often remove them.

CYSTICERCUS ZEMICOLLIS.

Considerable numbers of this hydatid are found in the abdominal cavity, omentum peritoneum, liver, and kidney. No symptoms are shown, but without the appearance of much harm they may be destructive to life. The treatment is similar to that of the last mentioned parasite.

Many hog-raisers speak of kidney worms, characterized by the animal's losing the use of its posterior parts. I have failed to find worms in the kidneys that could produce any well-marked disease.

General Care and Treatment.—The natural haunts of the pig in a wild state are in the torrid zone. Swine are never found in a northern climate. They must therefore be protected from cold. The pens should be warm, and at the same time well ventilated. The ventilation should be at the top, as it is absolutely necessary in cold climates to utilize the natural heat of the hog to keep the pen at a moderate temperature. There should be no ventilation below in winter. The floor of the pen should be covered with a foot of clay, the feeding floor should have several inches slope to carry off rain. By having the feeding floor open to the rain, sun, and wind, it is kept pure. The lot should slope away from the pen, in order that rain may assist in removing refuse matter from the surface. Straw or leaves are not necessary in the sleeping rooms when clay is used. The hog in its wild state grew up and roamed in the forest until maturity. Being allowed free use of their noses, and being omnivorous by

nature, they fed on worms, roots, mast, and such food as was adapted to them. They exercised as their inclinations or necessities inclined; had access to springs and streams of running water; slept in storm-sheltered thickets, on beds of clean leaves, and enjoyed under these circumstances a vigor of constitution and immunity from disease unknown to modern swine-breeders. As the country became populated and agriculture advanced, the long-nosed hog began to disappear. Agriculturists found that a hog fed to profit must have an inbred tendency, with close confinement. We thus see that the hog of to-day is of impaired constitution, and that its habits, as imposed by the will of the farmer, do not approach so nearly a strict observance of the laws of health as do the instinctive habits of the animal in an unrestrained state of nature.

As I have said, the most improved methods of swine breeding have proclaimed the nose of the hog a useless appendage. Rings are put in his nose which deprive him of animal food, and force him to live almost upon an exclusively vegetable diet, mostly of corn. The object in feeding swine is to accumulate fat as rapidly as possible in those intended for market, to keep stock hogs in healthy, growing condition, and to have breed sows in the best condition for bearing. To accomplish this the stomach must be kept in a healthy condition, and not overloaded. Hogs should not be fed on an exclusive diet of corn and water. Green food should be furnished them. Hogs fed on corn may have sour slops fed to an advantage. If kept on clover, slops should not be given, but rather roots and vegetables, such as potatoes, turnips, etc. An exclusive clover diet is not proper food for the hog. It is very good if the hog receives a supply of potatoes, turnips, corn, etc. I have seen relief afforded by change of food when hogs were dying rapidly on an exclusive clover diet. When a herd does not eat well, the tongues of a few should be examined. If the tongues are red and contracted, give some slop or turn them to clover pasture, and they will at once improve. If their tongues are large, pale and flabby, give corn, cornmeal,

cooked root vegetables, and use soda in the feed. If farmers must keep their hogs on grass, and must use rings to save their clover, they should furnish the food which the hog's nature requires. As a rule, the constituents of all grasses and annual plants are acid, have an acid reaction. Especially is this the case with clover. Root vegetables have an alkaline reaction, and are composed largely of phosphates and soda salts. In clay soils, hogs can probably supply themselves from the ground with phosphate, but when confined to a black, loaming soil they can obtain but little of these necessary salts from the earth. Where root vegetables cannot be obtained, and hogs are kept on a clover range, soda and lime, or sulphate of iron, should be given freely. Corn should not be given exclusively; roots should be given in order to make a change in the bill of fare. If the corn is cooked, it will make much better food. The water should be clean, pure, running water, and should be within reach of the hogs at all times. During the hot months it seldom happens that hogs have a proper supply of good, pure water. In many cases the animals have only thin mud or stagnant water. Young pigs, if reared on a floor, frequently become ill and die when four or five weeks old. In such case they should be moved from the wooden to a dirt floor; if possible, it should be a clay floor. If pigs and mother be moved at once, immediate relief is obtained.

Pigs may be weaned at six weeks old, and soon after they may be castrated.

THE DOG.

LII.

THE EARLY HISTORY OF THE DOG.

From the earliest known history, the dog, the companion and friend of man, is found in almost every part of the globe. He is supposed to have originated from the wolf, another variety of the same family. Their inclinations to associate with each other, their readiness to breed together, and anatomical similarity, seemed sufficient proof of relationship. But even this is not absolute proof that the dog originated from the wolf. From earliest history, the dog has been the same docile and affectionate animal as now. Intellectually, the dog ranks next to the human. The inferior animals are, to a certain extent, endowed with the same faculties as ourselves. Hatred, love, fear, courage, jealousy, and many varied passions influence and agitate them as they do human beings. The dog is susceptible to every impression. With regard to intellectual power, the difference between man and animals is in degree, and not in kind. In the quadruped as well as the biped, knowledge is derived from the perception of things around us. A certain impression is made on the outward fibers of a sensitive nerve. That impression in some mysterious way is conveyed to the brain, and there it is fixed, imagination combining it with many impressions. Judgment determines the value of it and the conclusions that are to be drawn from it.

The writer has frequently observed this phenomenon of impressions and the keenness of perception in dogs during operations. Often, when approached for examination, they at first offer resistance. All at once, however, something seems to strike their minds. They will utter a little whine, wag their tails, crouch at our feet, and lay themselves down for inspection. A word or two of kindness is all that is necessary, and they will readily submit to the most painful operation. This is better

exemplified in the female. The flesh quivers as the knife pursues its course, a moan or two escapes, but yet she does not struggle; and her first act, after all is over, is to lick the operator's hand. Years may pass, but whenever she sees the operator she testifies her joy and gratitude in the most expressive and endearing manner. Often, seeing me on the crowded street, they will cross over for recognition.

The important faculty termed attention is well developed in the dog. It is this which distinguishes the promising from the unpromising pupil, and the scientific man from the superficial and ignorant one. The power of keeping the mind steadily upon one purpose is the great secret of individual and moral improvement. We see the habit of attention carried to a very considerable extent in the dog. The setter or pointer stands firm to his point, even though the blunders and unskillfulness of his master annoys him. The fox hound, insensible to a thousand scents, and deaf to every sound, anxiously and perseveringly searches out the track of his prey. The drover's dog, leading a flock of sheep through pastures and crowded streets without losing a single one and without human aid; the terrier eagerly watching for vermin—these are striking illustrations of the power of attention. The faculty of memory in the dog and horse is remarkable, of which we could give numerous instances. The dog has remarkable powers of observation and reasoning, independent of any training, many of his performances being entirely voluntary and the result of causes dependent upon accidental circumstances alone. A good bird dog will noiselessly withdraw from his point, hunt up his master, and induce him, by peculiar signs, to follow to the spot where he had observed the birds. The St. Bernadine is remarkable for such faculties, so much so that he is employed in the Alps to search for frozen wanderers, administer refreshments, and lead them to places of safety and shelter. The St. Bernard is known to have voluntarily gone a distance of a mile, bark and make a noise at a neighbor's door, inducing some one to follow him to the rescue of man or

beast. In every country and in every time there have existed between man and dog associations different from those with other animals. Other animals may be brought to a certain degree of familiarity, and may display much affection and gratitude, but they can rarely be said to love or even recognize us, except for the satisfying of their wants. The horse will exhibit degrees of affection; he will share some of our pleasures, enjoys the chase, and feels the influence and emulation of victory, but his affections are selfish and easily transferable. With the dog, however, it is otherwise. His courage, his fidelity, and devotion induce us to admire and love him. If he transgresses and is punished, immediately when it is over, by some significant gesture, he will acknowledge his consciousness of deserving what he has suffered. He will fly to us with alacrity and submissively lay at our feet. A glance of the eye is sufficient, for he understands the least expression of our will. He has all the candor of friendship, with fidelity and constancy in his affections. He is all zeal and obedience. Neither interest nor desire of revenge can corrupt him, and he has no fear but that of displeasing. He speedily forgets ill-usage, or only recollects it to make returning attachments the stronger. He licks the hand which causes him pain, and subdues his anger by submission. He shares in our abundance, and he is content with the scantiest and most humble fare.

CARE OF THE DOG.

Where one or two dogs are kept, they generally take a sufficient amount of exercise of their own accord. Kennel dogs should be exercised daily. In feeding dogs, the little puppies should be taught to lap milk when about three weeks old. The milk should be scalded and slightly sweetened. When the puppies are about four weeks old, they may begin taking a little soup, to which stale bread is added. This will pass them over the weaning period, which usually takes place when the puppies are six weeks old. The young dog should receive a mixed diet of well-boiled meats and vegetables. They should not be allowed

much meat; they require some, but it is safer to give principally a vegetable diet. The puppy should be fed four times a day until he is four or five months old. He may then be fed twice a day, receiving very little in the morning. The largest feed should be at night. When the puppy is two or three months old his condition should be carefully watched. His food at this time should be limited, for two reasons—first, that his body may not become too heavy for his legs, causing rickets; and, secondly, lest derangement of the digestive organs lead to distemper and various other diseases. Proper exercise and nourishing diet are all that is required to keep the dog strong and healthy. The various prepared dog foods should not be used except for convenience, where other food cannot be procured.

Hunting dogs should receive abundant food, with plenty of meat. They cannot do their work well unless judiciously fed. Each dog of the kennel requires particular and constitutional care. Not more than four or five hounds should be let into the eating apartment at a time, so that the feeder may have each hound under observation. Some hounds cannot run if they carry much flesh; others are improved by it. Much depends upon the management of the kennel. The keeper must be thoroughly acquainted with the appetite of every hound, for some will eat too much, and others will require inducement to feed. The food should be boiled in two iron kettles—the oatmeal in one, the flesh in another. The flesh should be cut in very small pieces and mixed with meal. It should be stirred for two hours and then transferred to flat coolers.

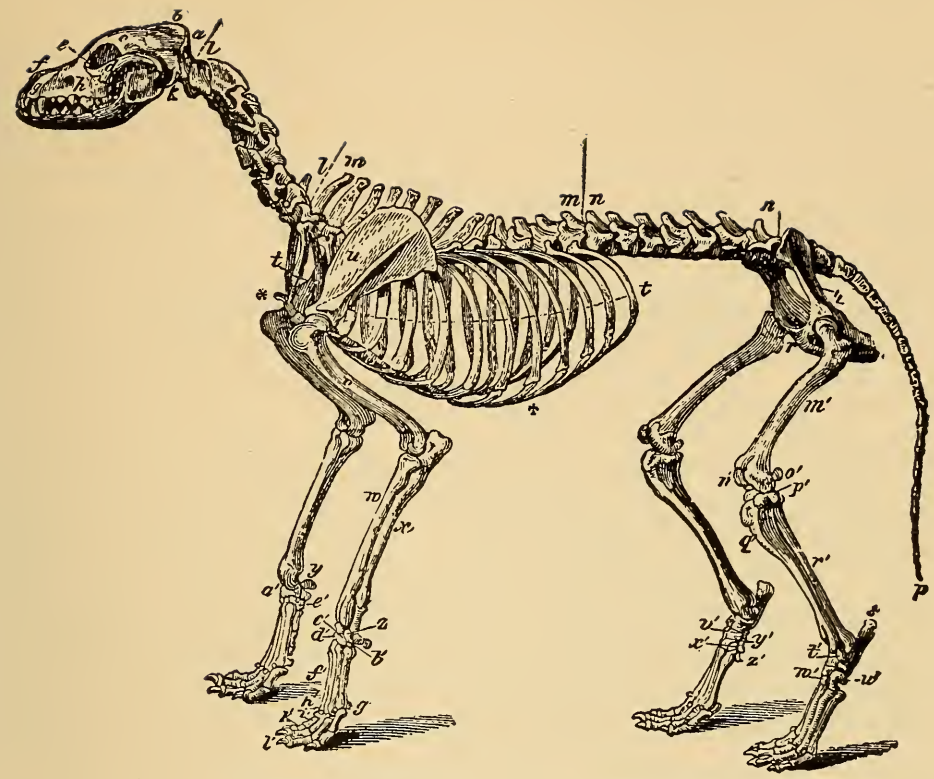
Delicate hounds succeed well on dry, unboiled oatmeal. When once induced to take it, they will eat it readily. Other hounds of delicate constitution may be tempted with a little additional flesh. In summer an extra cow or two should be kept in the dairy. The skimmed milk may be used instead of flesh. About Christmas is the proper time to arrange the breeding establishment. The bitch should not breed before she has hunted two seasons, for before that time it will be scarcely possible to ascer-

tain her hunting qualities. If there is any considerable fault, she should not be bred. The pregnant bitch should not be allowed to engage in long and severe chase, but kept as quiet as practicable. She should not receive too great abundance of food. Her condition should be carefully watched before and during pupping. After pupping, she should receive an increased amount of food, with plenty of milk. Her constitution will decide how many puppies should be left with her to raise. When the puppies are sufficiently grown to run about, they should be placed in a warm situation. A small kennel should be built as a favorable place for them to pass through the distemper, which they will undoubtedly have sooner or later. When young hounds first enter the main kennel, they should be kept separate to avoid quarreling.

The hounds should be walked out every day and taught to follow the horse with the keeper. They should be taken out on the public roads. The keeper must be kind and patient, otherwise he is not fit to attend a kennel. He should try to teach the dog the nature of his fault before correcting him. The whip should seldom be used, as it generally does more harm than good, not being used judiciously. The young hounds may be coupled to the older ones, and should be taken out among the sheep until they disregard them. They should not be allowed to hunt improper game. They should be taken out in the country over which they are afterwards to hunt, and young foxes may be turned out for them to pursue, until they are turned out to hunt game in earnest. They should be frequently called out in the kennel and their names gone over. As the sporting season approaches, the hounds may be divided in two packs, to be taken out alternate days, and finally the whole pack may be taken out together. The horn should be used only as an instrument of speaking to the dogs. Each note should indicate some action, which they should be taught to obey. A certain note should call them together, another call up a lost hound, and another should be used when the fox breaks cover.

LOCATION OF KENNELS.

This is very important. The kennel should be located in a dry and warm situation, and it is of great importance that it be located on a clay soil. If located on a gravelly or porous soil, from which vapors are continually rising to dampen the building, the dogs will be attacked with rheumatism, known as "kennel lameness." The dogs should never be washed in the evening after the day's hunt, but on the day following. Where a deep super-soil of clay cannot be found, one or two layers of bricks or stone may line the floor. A clean bed of straw should be allowed every second day, or oftener when the weather is wet. The lodging house should be sealed, and there should be shutters on the windows. Stoves should not be used in kennels. By lying together, dogs will keep warm in a correctly-built kennel. The plans of the kennel may be left to the good judgment of the owner.



SKELETON OF THE DOG (CARNIVORA).

AXIAL SKELETON.

THE SKULL.

Cranial Bones.—*a*, Occipital, 1; *b*, Parietal, 2; *c*, Frontal, 2; *k*, Temporal, 2; Sphenoid, 1; Ethmoid, 2; Auditory ossicles, 8.

Facial Bones.—*f*, Nasal, 2; *e*, Lachrymal, 2; *d*, Malar, 2; *h*, Maxilla, 2; *g*, Premaxilla, 2; *i*, Inferior maxilla, 2; Palatine, 2; Pterygoid, 2; Vomer, 1; Turbinals, 4; Hyoid (segments), 9. Teeth—Incisors, 12; Canines, 4; Molars, 26.

The Trunk.—*l l*, Cervical vertebræ, 7; *m m*, Dorsal vertebræ, 13; *n n*, Lumbar vertebræ, 7; *o*, Sacrum (three segments), 1; *p p*, Coccygeal vertebræ (variable), 20; *t t*, Ribs, 26; * Sternum (eight sternebræ), 1; ⁘ Costal cartilages.

APPENDICULAR SKELETON.

PECTORAL LIMB.

u, Scapula, 2; *v*, Humerus, 2; *w*, Radius, 2; *x*, Ulna. Carpus—*y*, Trapezium, 2; *z*, Cuneiform, 2; *a'*, Scaphoid, 2; *b'*, Unciform, 2; *c'*, Magnum, 2; *d'*, Trapezoid, 2; *e'*, Pisiform, 2; Metacarpal bones, 10; *h'*, Anterior sesamoids, 10; *g'*, Posterior sesamoids, 20. Digit—*i'*, Proximal phalanges, 10; *k'*, Mesian phalanges, 8; *l'*, Distal phalanges, 10; Small sesamoids wanting.

PELVIC LIMB.

Pelvis.—Os Innominatum—*q*, Ilium, 2; *r*, Pubis, 2; *s*, Ischium, 2.

The Limb.—*m'*, Femur, 2; *o'*, Fabellæ, 4; *n'*, Patella, 2; *q'*, Tibia, 2; *p'*, Tibial sesamoid, 2; *r'*, Fibula, 2. Tarsus—*s'*, Calcaneum, 2; *t'*, Astragalus, 2; *u'*, Cuboid, 2; *v'*, Superior cuneiform, 2; *w'*, Ecto-cuneiforme, 2; *x'*, Meso-cuneiforme, 2; *y'*, Endo-cuneiforme, 2. Metatarsus—Large bones, 8; *z'*, Small bones, 2; Anterior sesamoid, 8; Posterior sesamoids, 16. Digit—Proximal phalanges, 8; Mesian phalanges, 8; Distal phalanges, 8; Small sesamoids wanting.

VISCERAL SKELETON.

Os Penis ,1; Rudimentary clavicle (inconstant), 2.

The bones of the Carnivore Skeleton, thus considered, are 345.

LIII.

CONTAGIOUS DISEASES OF DOGS.

DISTEMPER.

By this singular name is distinguished a febrile disease due to the operation of a morbid poison, occurring spontaneously from ordinary causes of disease, or as a result of contagion and infection. The disease is known throughout the world. Dogs of all ages are subject to its attack, but it oftenest appears between the sixth and twelfth month of the animal's life. If at an earlier period, it generally proves fatal. Distemper, like all contagious and infectious diseases, has an uncertain but short period of latency. As a rule, it affects the system but once, and sometimes prevails as an epizootic. It varies in different breeds. The shepherd is scarcely ill a day with it. The terrier comes next in liability, the hound next, and after him the setter. The small spaniel comes next, followed by the pointer. The pug is next in order, and the Newfoundland suffers more than any other breed. Should a foreign dog be affected, he almost certainly dies. The delicate stallion grayhound has little chance when imported from abroad. The disease differs not only in different species of dogs, but in different breeds of the same species.

Symptoms.—The primary symptoms are those of fever, associated with those of catarrh. The dog shivers, is dull, restless, the eyes are weak and watery, the nose dry, the appetite partially lost, with increased thirst and frequent attacks of sneezing. In the course of five or six days the nasal discharge becomes more profuse. The eyes are weaker and the discharge from the eyes is much increased. Very often the eyelids are gummed together, and the animal is temporarily blind. A husky cough is present, at first dry and husky, afterwards moist. The pulse may

run from 120 to 160, with elevated temperature. Frequently an opacity spreads over the cornea, quickly succeeded by ulceration. The first of the ulceration is generally seen in the center of the cornea, and is circular. The ulcer widens and deepens; sometimes it eats through the cornea, and the aqueous humor escapes. As the disease advances, the dog becomes so feeble at the end of a week that it can scarcely stand. The appetite is almost entirely lost. Food is quickly vomited or passes through the intestinal canal in a fetid, ill-congested condition. At the end of a fortnight the symptoms may abate in intensity and the dog slowly regain its strength. Sometimes epileptic fits come on, making a serious complication. If a second fit come on within a day or two the dog is generally lost. These fits may appear without warning; if their approach be carefully watched, they may possibly be prevented. The champing of the lower jaw will be seen at least twelve hours before the first fit.

The inflammation extends to the lungs in some cases, producing pneumonia. If the ear be placed to the chest, the crepitating sounds of pneumonia will be detected. Intestinal complications are indicated by violent vomiting and purging. The fæces vary from white, with a slight tinge of gray, to a dark slate color. By degrees mucus begins to mingle with the fæcal discharge, and then streaks of blood. The case when in this condition is almost hopeless. Jaundice is a frequent complication. An intense yellowness suddenly appears all over the dog. The result of this complication is usually unfavorable. In most instances cutaneous eruptions are seen on the inner surface of the thighs and other parts where the hair is thin and downy. These eruptions peel off in large scales, causing the hair to be filled with them.

Treatment.—In the early stages, if the bowels are at all irregular, a small dose of castor oil is to be prescribed. The dose varies from a teaspoonful for a young puppy to an ounce for a well-grown dog. After the purgative acts I have received the best results from sal. acetate of ammonia, four drachms; nitrous

æther, six drachms; water, four ounces. Give a teaspoonful every three hours. The animal should be kept warm by clothing the body. Plenty of good, fresh water, or milk and water, should be given. The nose and eyes should be repeatedly sponged, and the food restricted to a milk and water diet, or the various liquid foods recommended in this work may be used. This simple treatment, if thoroughly carried out, will cure most cases. Prof. Williams recommends the use of six-grain doses of the hyposulphite of soda, with one drachm of sweet spirits of nitre. When there is excessive purging, it should be arrested by a good dose of epsom salts, to carry away anything that may act as an irritant; after it has acted, a scruple of powdered chalk, ten grains of catechu, and five of ginger, with a quarter of a grain of opium, made into a ball with palm oil, may be given to a middle-sized dog twice or thrice every day. If worms are present, a scruple to one drachm of areca nut should be given. If from teething, the gums are to be lanced. If vomiting is excited, it should be allayed by giving from two to four drops Scheel's strength of hydrocyanic acid. If jaundice is present, the bowels should be opened with epsom salts, and then give half-grain doses of calomel twice a day. When fits are present, and the animal is strong, a grain of calomel and a quarter of a grain of opium should be given. The pulmonary complications are best relieved by the application of hot flannels to the sides. If chorea be a complication, and summer is approaching, the dog may recover. Nitrate of silver, in doses of one-eighth of a grain, made into pills with linseed meal, and increased to a quarter of a grain, should be given morning and night. Nourishment must be forced upon the animal if it will not take it spontaneously. The milk food recommended in this work should be given. As soon, however, as spasms spread over him, accompanied by a singular half fetid smell, the poor creature moaning and crying, humanity demands that we put an end to that which we cannot cure.

SMALL-POX.

This disease, first seen in 1809, receiving its name at the Royal Veterinary School at Lyons, is propagated from dog to dog by contagion. It is not difficult to cure.

Symptoms.—There is an unnatural red color of the skin in the region of the belly, groin, and inside the fore arm. These parts are sprinkled with little red spots, irregularly rounded, which gradually grow larger for several days, becoming very prominent at their centers. About the fifth day the redness of the centers begins to assume a grayish color. On the summit is a white circular point, containing a quantity of nearly transparent fluid, covered by a thin and transparent pellicle. This fluid gradually changes to pus, ultimately of purulent character. The pustule becomes flattened, and desiccation and desquamation takes place about the tenth day.

The near approach of the eruption is announced by an increase of fever. After desiccation the skin remains covered with brown spots, which by degrees disappear, sometimes leaving little spots on which the hair does not grow. A moderate temperature is the most favorable to recovery. Exposure to cold is generally fatal. The dog suffering from small-pox has a very offensive breath, and the fæces are also very fetid. In some instances pneumonia occurs as a most serious complication.

Treatment.—Give a dose of castor oil and follow with sal. acetate of ammonia, drachms four; nitrous æther, drachms six; water, q. s. four ounces. Give a teaspoonful every three or four hours. This is generally all that is required.

RABIES.

This is one of the most important subjects in veterinary pathology, and one in which every practitioner of human medicine should be thoroughly interested. The disease has its origin in the canine. The specific virus is conveyed in the saliva of the affected dog through wounds to other animals and to man. Opin-

ions are divided on the spontaneous origin of rabies. I do not believe that the disease has ever originated spontaneously, but that it originates only by innoculation. Rabies once generated in a dog is transmissable by innoculation to every warm-blooded animal. The disease may occur at any month in the year, and in the female as well as in the male. The virus, when introduced into the system, generally lies dormant for a very indefinite period, the shortest period in the dog being about seven days, and the longest one hundred and fifty-five days. The period in the majority of cases, however, runs from seven to thirty-five days.

Symptoms.—The symptoms of rabies are essentially the same in all warm-blooded creatures. The dog becomes restless and continually shifts his posture, searching new resting places, but very soon changing them. He lies in dark corners, shuns the light, and gazes strangely about him, with countenance clouded and suspicious. He becomes more fidgety, lying down and jumping up again in an excited, unnatural manner. At this stage he shows no disposition to bite, and answers the call upon him laggardly. A peculiar delirium is an early symptom, and one that never deceives. There is a desire to lick anything cold, to rest the nose on a cold object, and to pick up bits of wood and straw. The movements of the animal now become unsteady. He will stare at an imaginary object, then rush forward and bite at anything in his way. He may start up after a few moments of quietude, with unmingled ferocity depicted on his countenance, and plunge with a savage howl to the end of his chain. He may stop and watch the nails in the partition, and fancy them to be moving, he will start at them. The symptoms becoming still more severe, the desire to bite is greatly increased; the pupils are dilated, the conjunctiva is red and injected; the eyes alternately wide open with fury, and then closed in a dull, but fierce manner. The forehead becomes wrinkled, and the animal has a terrifying and repulsive look. The presence of any living or shining object will bring on a paroxysm of rage and excitement. Between the

periods of excitement there is great prostration, the exhausted animal lying down in the quietest spot it can find, insensible to all surrounding objects, until, all at once, he springs up greatly agitated.

The bark of a rabid dog is husky, spasmodic, and more in the nature of a howl. The jaw drops, exposing the tongue, which is dry, and the bronchial membrane is of a brownish hue. If the dog be spoken to by his master he will be recalled from watching the motes flying in the air or the insects on the wall. Dispersed by the magic influence of his master's voice, every object of terror disappears, and he crawls toward him with the old expression of attachment. A moment of quietude comes, the eyes slowly close, the head drops, and the fore feet seem to be giving away, as if he would fall; but with renewed paroxysm he springs up again, gazes wildly around, barks, snaps, and rushes to the extent of his chain. The dog loses the power of swallowing, owing to the spasmodic contraction of the throat. The animal does not dread water, but, on the other hand, will plunge its muzzle deeply in, and make effort to drink. A mad dog, when loose, will travel a great distance in a short time, finally endeavoring to return home, generally rushing at everything in its way, but preferring to attack other creatures than man. There is, in the first stages, a flow of saliva from the mouth. The urine is high colored, the bowels are constipated, the pulse accelerated, the gait is unsteady, the tail drops, the head is depressed, the nose protruded, and the scent, sight, and hearing are much impaired. The dog frequently vomits, and ultimately dies from coma, exhaustion, and suffocation. The rabid dog, when loose, travels with his tail depressed, and seemingly half unconscious of surrounding objects. His open mouth, protruded and black tongue, and rolling gait sufficiently characterize his condition. In the very earliest period of rabies, a person accustomed to dogs will detect the existence of the disease. The animal runs as if in pursuit of imaginary objects. The countenance changes, with alternating brightness, and he wags his tail as though some pleasing vision

passed before him; then his countenance indicates the dislike and fear with which the intruder is regarded. When the vision seems within proper distance, he darts on it with violence. The absence of pain, for the most part, is an almost invariable accompaniment of rabies, though dogs will sometimes gnaw and tear the flesh from their limbs. The appearance of the eye is an important symptom. There is at first singular brightness, but later it becomes dull and wasted. In about forty hours from the first clouding of the eye it becomes a disorganized mass. The bark of the mad dog is perfectly characteristic. There is no other sound that it resembles. The muzzle is elevated, and the commencement is that of a perfect bark, ending in a howl, with a rising inflection an eighth higher than at the commencement.

Hydrophobia in man is characteriezd by symptoms similar to those of the dog, except perhaps that there are symptoms of intense pain in the seat of the wound in man. The man will have frightful dreams, with a peculiar delirium. The image of the dog that attacked him is always before him. Some complain of smothering, and pant violently, as if an enormous weight oppressed the chest. The power of swallowing is lost almost entirely in the human being. The expression of the countenance and eye is similar to that of the dog. Convulsions come on, and the sufferer will spring from his seat, uttering the most fearful howling and tearing everything around him; then becoming rational, he regains his reasoning powers and talks intelligently.

The same delirium seen in the dog occurs in the human patient, and is described by Dr. Bardsley as follows: "I observed that he frequently fixed his eyes with horror and affright on some ideal object, and then with a sudden and violent emotion buried his head beneath the bed clothes. The next time I saw him repeat this action, I was induced to inquire into the cause of his terror. He asked whether I had not heard howlings and scratchings. On being answered in the negative, he suddenly threw himself on his knees, extending his arms in a defensive posture, and forcibly threw back his head and body. The muscles

of the face were agitated by various spasmodic contractions; his eyeballs glazed and seemed ready to start from their sockets, and at the moment, when crying out in agonizing tone, 'Do you not see that black dog?' his countenance and attitude exhibited the most dreadful picture of complicated horror, distress, and rage that words could describe or imagination paint."

Hydrophobia in the horse is similar to that of the dog, with the exception that the remissions and paroxysms are less apparent in the horse. The dog seems, for a time, to be almost freed from the disease, but in the horse the absence of anxiety, restlessness, and exhaustion is of much shorter duration, and the fits of violence more violent and prolonged, killing the animal on the second or third day. The sexual desire is increased in the mare and horse during the course of the disease.

The symptoms of rabies in the cow, sheep, pig, goat, rabbit, and cat are very similar to those in the dog. In the cow there is paralysis of the hind extremities, before death, as in the horse.

Post-mortem appearances of a dog affected with rabies show a paralysis of the lower jaw, a discoloration and swollen condition of the tongue, which hangs from the mouth, with superfluous blood in the outer inferior part. The color varies from a dark red to a dingy purple, or almost black. The fauces situated at the posterior part of the mouth generally exhibit traces of inflammation. A strange post-mortem exhibit is the presence of indigestible matter, probably small in quantity, in the back part of the mouth. This indicates the depraved appetite and loss of power in the muscles of the pharynx. The epiglottis is more or less injected in every case of rabies. The edges of the glottis show inflammation. The stomach and its organs may contain a strange mass of hair, hay, straw, earth, horse fæces, etc. There is a peculiar inflammation of the stomach. It is more intense on the summits or folds of the stomach. Well-marked extravasation of blood or diffused inflammation is seen throughout the stomach and bowels. The liver, spleen, kidney, and muscular system are congested. No conclusions can be drawn from the lesions of the

brain, the principal post-mortem appearances being œdema or congestion, sometimes in patches, of the brain and spinal cord.

PREVENTIVE TREATMENT.—This should not be resorted to in the dog. The bitten animal should be destroyed at once. All dogs inoculated with rabies poison do not become mad, but the risk is so great, and the mischief they may inflict of so grave importance, that no chances should be taken.

If a person has been bitten, a complete excision of the bitten surface should be made as soon as possible after the injury. The knife should not come in contact with, but should be carefully passed beneath, the bitten surface. After excision is completed, the parts should be burned with a pencil of nitrate of silver, applied to every recess and sinuosity of the wound. Where this treatment is carried out in man, seven out of ten escape, while if no such means are used eight out of the ten die.

Pasteur has given to the world a method by which those bitten can be rendered insusceptible before the mortal malady has had time to declare itself. Those bitten should, if possible, be sent to his institution for treatment.

LIV.

ENZOOTIC AND EPIZOOTIC DISEASES OF DOGS.

DISEASES OF THE SKIN—MANGE.

Dog mange is due to an insect, the sarcoptes canis. The disease is transferable to man. I have seen cases of a mangy dog almost covered with eruptions.

Symptoms.—There is an itching, with formation of red points like flea bites, vesicles, pustules, and scabs. The red points may be plainly seen on the inside of the thighs and under the abdomen.

Follicular scabies is a frequent form of mange, due to the presence of the ascarus demodox folliculorium.

The symptoms of the disease are the formation of small pimples and circumscribed spots, from which the hair falls out; scabs form from the discharge of the contents of the pustules, with cracking and bleeding of the surface. A positive diagnosis of the parasite can only be made by the aid of the microscope. The disease is not so contagious as scabies. Its duration may be a year, and even longer.

Treatment.—Creosote, four drachms; olive oil, seven ounces; sol. potassium, one ounce. The affected parts should be dressed with this about twice a week. Where the whole body is affected the animal should be clipped. Before making the application, wash the dog thoroughly with soft soap.

ECZEMA RUBRUM.

This is an eczematous affection occurring among sporting dogs. It is caused by improper diet and by running through long grass when it is wet.

Symptoms.—There is redness of the skin along the back, breast, and belly. The parts are hotter than natural and irritable. There may be falling off of the hair in patches, and slight constitutional disturbance, as fever, loss of appetite, etc.

Treatment.—Externally, lead acetate, ounce one; zinc sulphate, drachms six; water, one quart, should be used as a wash. The patient should receive a drachm of jalap to open the bowels, and the food should be milk and porridge or other liquid foods. No meats should be given. The following is a safe and very effectual remedy: Sulphur, one drachm; potassium carbonate, one drachm; lard, one ounce.

LV.

DISEASES OF THE NERVOUS SYSTEM.

EPILEPSY.

This frequently occurs in dogs as the result of intestinal derangement, as worms. It is frequently a result of distemper, and follows teething in the puppy.

Symptoms.—The patient falls to the ground, froths at the mouth, etc. The attack lasts three or four minutes, followed by dullness, from which the dog soon recovers.

Treatment.—See that the patient gets plenty of air. A piece of wood should be inserted between the teeth to prevent biting the tongue. Calomel, one grain; tartar emetic, one grain, made into a pill should be given. Potassium bromide, in twenty-grain doses, should be given every two hours until the fits cease. Fits may be warded off by seizing the dog by the nape of the neck and dashing cold water in his face.

CHOREA.

This is an irregular distribution of nerve power, characterized by convulsive, involuntary, twitching of some muscle or set of muscles. It sometimes follows distemper, and may affect one or two limbs. It sometimes pervades the whole system.

Symptoms.—There is a spasmodic, jerking action in one leg or shoulder, seen particularly when the dog is lying down. When standing, there is a sinking of the head and neck. It sometimes affects principally the muscles of the neck and face. If a case of chorea be neglected, this spasmodic action of the muscles spreads over the body, and the dog lies extended with every limb in constant and spasmodic action.

Chorea is oftenest seen in young animals, and is a result of

distemper, bad feeding, cold and damp housing, debility, worms, and chronic affections.

TREATMENT.—The bowels should be kept in good condition by giving oil. Iron and gentian are serviceable as tonics, five or ten grains of each. Silver nitrate is highly recommended, combined with ginger, in doses varying from one-sixth to one-third of a grain, according to the size of the dog. If the dog is in fair condition, and the season favorable, a cure may be made. If there is general debility and loss of flesh, a cure cannot be effected.

RHEUMATISM.

Rheumatism occurs in the dog in the acute and chronic forms. The attack comes on rather suddenly, the joints swell, the pulse becomes full and tense, the eyes blood-shot, the stomach deranged, and the bowels costive. Severe pains run through the articulation, the tongue is coated, the muzzle hot and dry, and the poor animal howls with agony. The causes are numerous—exposure to bad weather, remaining idle and wet after coming from the water, damp kennel, luxurious living, etc.

Chronic rheumatism is known as gout. There is pain in the parts, the muscles are tender and the joints stiff, with but little inflammation. The pain seems to be removed by exercise.

TREATMENT.—Give extract of colocynth, one scruple; calomel, ten grains, powdered gamboge, two grains; aloes, ten grains. Make into four pills, and give two at night and two in the morning. The dog should be wrapped in blankets, and a warm bath may be used. The bowels should be kept in proper condition by giving purgatives. Plasters may be applied to the spine. The treatment of chronic rheumatism is similar to the treatment of the acute form; consists of warm baths, warm housing, a strict attention to diet, and keeping the bowels in proper condition. Stimulants may be applied to the parts. The spirits of camphor is excellent for this.

PALSY.

This is characterized by partial or complete loss of motion or sensation in some part of the muscular system, and is common in the canine race. The loins and hind limbs suffer more frequently than other parts.

Symptoms.—The animal may eat well and seem cheerful, but his belly is tucked up, and there are two longitudinal cords parallel to each other, which will scarcely yield to pressure. Castor oil will remove the trouble, and should be given freely until the proper effect is produced.

LVI.

DISEASES OF THE DIGESTIVE ORGANS.

ENTERITIS.

No animal suffers so frequently with inflammation of the bowels as does the dog. His intestines are peculiarly irritable and subject to inflammation. A cold temperature is a common cause of the disease.

Symptoms.—A great thirst, blood-shot eyes, a tender and corded belly; his cries are frequent and piteous; he avoids food, and looks around at his flanks with lingering gaze, accompanied by a cry or groan. Its prevailing cause is exposure to cold, especially after fatigue, or lying on wet stones or grass.

Treatment.—Place the patient in a warm bath. The abdomen should be rubbed while in the bath. Emetics should be given, but not too frequently. An ounce of castor oil should be given. The spirits of white poppies is highly recommended in this disease. The pulverized or tincture of opium is also useful, given in doses of eight grains of the powder or ten to fifteen drops of the tincture every four hours.

PERITONITIS.

An inflammation of the peritoneal membrane frequently occurs in the dog, characterized by loss of appetite; the belly is tucked up, hard, and contracted, and there is a frequent pulse. The dog may whine and try to hide himself.

Treatment.—Castor oil should be given. Tincture of opium may be given in ten to fifteen drop doses, according to the size and age of the animal. It may be given every four hours.

COLIC.

The dog is subject to fits of colic, caused by sudden changes of food, improper food, and exposure to cold.

Symptoms.—The dog labors under fits of pain. He may lie in a corner quietly for a minute, but when the pain comes on he utters a yelp and seeks a new place. This is continued, and the animal shows intense suffering.

Treatment.—Castor oil is the favorite purgative in this affection, and should be used in all bowel troubles. Tincture of opium, ten or fifteen drops; sweet spirits of nitre, one drachm, may be given every three hours to relieve pain. Enemas should be administered and the abdomen fomented with warm water. Flannels wrung out of warm water may be applied to the abdomen.

DIARRHOEA.

This is a discharge of an undue amount of liquid fæces. It is caused by improper feeding, or overfeeding. This condition should not be checked too soon, but if it continues and the animal is becoming weak, it must be stopped. Give a tablespoonful to an ounce of castor oil to remove the irritant. Give milk that has been boiled for ten or fifteen minutes. Fifteen drops of the tincture of opium may be used.

DYSENTERY.

The dog sometimes suffers with dysentery, which is a serious complaint. It is an inflammation of the mucous membrane of the intestines. The symptoms are a discharge per anus of mucus and blood. A very small amount of fæces is evacuated at a time, and there is great straining.

Treatment.—Enemas containing tincture of opium may be administered. A small dose of castor oil should be administered. Tincture of opium and sweet spirits of nitre may be used, in doses of ten drops of opium to a half drachm of nitre.

COSTIVENESS.

This frequently is caused by the quality of food, such as feeding too greatly on bones. It occurs as a symptom of indigestion. A dog should never be allowed to remain costive more than two days.

Treatment.—A drachm of jalap or of aloes should be administered. After the bowels have moved, it is well to follow with a dose of oil. Clysters should be freely given. The dog may be put on a course of boiled liver and exercised every day.

CALCULUS IN THE INTESTINES.

Calculi are formed in all the lower animals. Calculi in the dog cannot be diagnosed. A true nature of the case can only be learned by post-mortem. The calculus may sometimes be discovered, however, by pressing on both sides of the abdomen. If discovered its removal may easily be accomplished.

INTUSSUSCEPTION.

By this is meant the slipping of one portion of a bowel within another. This disease cannot be diagnosed in the dog, but we find it in post-mortem. It cannot be distinguished from acute inflammation of the bowels.

DROPSY.

Dropsy of the abdomen frequently occurs in the dog, caused by an accumulation of fluid within the abdomen, generally as a consequence of some other disease, or it may be caused by a diminished absorption. It is most frequently caused in the dog by disease of the liver, induced by overfeeding and want of exercise.

Treatment.—Remove the cause, by proper food, and restore health by exercise. When it is due to organic disease of the liver, heart, and other organs a cure cannot be effected. Purga-

tives should be given occasionally; and powd. gentian, two grains; iron sulphate, two grains, in pill twice a day, should be used to improve the general condition.

The operation of paracentesis abdominus, or tapping, gives temporary but seldom permanent relief. Great benefit has been received from the use of iodine. The dog should receive a grain of iodine at a dose, and gradually increase to two grains three times a day.

LVII.

DISEASES OF THE LIVER.

The liver has an important function—namely, to receive the blood returned from the intestines and to secrete the bile, and then to transmit the remaining portion to the lungs, where it undergoes the usual process of purification, and is changed to arterial blood.

INFLAMMATION OF THE LIVER.

The animal becomes dull; the skin and urine are tinged with a yellow effusion, which hue increases day after day, as seen more particularly on the cuticle, the conjunctiva, the iris, and groins. The animal is fevered, with pulse from 80 to 120; the tongue hangs from the mouth, the appetite is gone, and there is intense thirst. The dog becomes very restless and hides himself; if the liver is pressed upon he will groan. The dog will lie stretched out on his belly, his legs extended in front and behind him. The yellow color increases with the fever, and he vomits a yellowish green substance mixed with blood. He passes blood by the anus, and soon dies. The duration of the disease is about ten to twelve days. If taken early and properly treated, it can generally be cured, but if it is of some days standing, and has taken on a typhoid character, or if inflammation of the stomach has taken place, with vomiting of blood and fits, it cannot be cured.

Treatment.—If in the first stages, epsom salts, two to four drachms, should be given. Later calomel, tartar emetic, camphor, and opium, of each a half grain made into a pill, may be given. A liniment should be applied over the region of the liver.

JAUNDICE.

The symptoms of jaundice in the dog are a yellow discoloration of the skin and mucous membrane. The causes of jaundice are chiefly over-fatigue, immersion in water, swallowing great quantities of indigestible food, and cold after long-continued exercise.

Treatment.—If constipation is present, an ounce of manna dissolved in water should be given, and the dog afterwards drenched with linseed oil. If watery diarrhœa should supervene, and the belly is not hot and tender, a drachm of sulphate of magnesia should be administered, and repeated if necessary. When the liquid excrement contains much blood, of a deep color, all medicines by the mouth should be substituted by frequent injections, consisting of starch and a few drops of laudanum. Great care should be taken in regard to the food. The liquid foods recommended in this work should be given and the animal gradually brought back to solid foods. He should be guarded from taking cold.

LVIII.

DISEASES OF THE KIDNEYS AND BLADDER.

INFLAMMATION OF THE KIDNEYS.

This seldom occurs, fortunately for the dog, for it is a dangerous malady. The immediate causes are blows and wounds in the lumbar region, long and continued exercise, improper food, long-continued use of stimulants, and the pressure of calculi.

Symptoms.—The animal moves stiffly. If the parts are manipulated over the region of the kidney, the animal evinces pain, the pulse is quickened, and the temperature elevated. The animal will frequently turn his head to the seat of pain. The bowels are frequently constipated, the belly tucked up, and the animal walks about as though under the influence of opium. Uræmic poison may set in, causing the animal to act as though intoxicated, and a strong uriniferous odor is given out in the perspiration. This condition is serious, and unless relief be quickly afforded the animal dies.

Treatment.—The kidneys must be relieved of work and kept quiet. A good oleaginous purgative should be given. Aconite in one-drop doses may be given, and carbonate of soda may be administered occasionally.

CALCULUS.

Calculus is sometimes met with in the dog, more frequently than in the horse.

Symptoms.—The urine is voided with difficulty. The animal walks slowly and in evident pain. He will make frequent attempts to urinate, which will come from him drop by drop. The dog may roll and whine or howl.

Treatment.—To remove the stones requires the operation of lithotomy. To perform this operation, the catheter should be passed up the penis to the extremity of the angle where the penis makes an acute angle forward; the point of the instrument must then be cut down upon, and from this opening the instrument may be readily passed forward into the bladder. The sound being introduced, pass a small bistoury along its groove into the bladder to effect an opening sufficient to admit the introduction of a small pair of forceps, by which the stone may be removed.

INFLAMMATION OF THE BLADDER.

Symptoms.—There is a trembling of the hind limbs, with frequent attempts to urinate. Small quantities are voided and passed in jets, containing some sediment that may be bloody. Colicky pains may be present, as the animal looks at his flanks, and there is an increased thirst.

An oleaginous purgative should be given. If the patient be female, tepid water and tincture of opium may be injected into the bladder. Enemas should be freely administered, and the animal should be kept well clothed.

LIX.

DISEASES OF THE RESPIRATORY ORGANS.

PNEUMONIA.

The symptoms of pneumonia are marked by protrusion of the head and tongue, the eyes are blood-shot, the breathing quickened, and the pulse is wiry and small. The dog sits up persistently, until, through extreme fatigue, his eyes close, his head drops, and his feet slip from under him. He may lie for a few moments, but will quickly rise again. Auscultation and percussion offer better aids of diagnosis in the dog than in the horse, and especially the stethoscope can be used more satisfactorily, owing to the softer hair of the dog.

Treatment.—Sal. acetate of ammonia, drachms four; nitrous æther, drachms six; syrup of lemon, drachms two; water, q. s. four ounces, a teaspoonful every three or four hours, should be used. Mustard applications should be made to the sides, and hot poultices used alternately with the mustard. The food should be of liquids. If this treatment is carried out the disease yields easily.

Congestion of the lungs is a frequent termination of pneumonia. It generally proves fatal to the dog. The treatment should be similar to pneumonia. During convalescence the following should be used: Two-fifths grain of strichnia, two ounces each of the essence of pepsin and pancreatin; a teaspoonful after meals.

PLEURISY.

Inflammation of the pleura in the dog, sometimes met with, may be easily diagnosed. The cough of pleurisy is well marked in the dog. It is painful and suppressed. There is tenderness of the sides, and the dog sits as in pneumonia. Auscultation reveals the true condition.

Treatment.—Give nitrous æther, drachm one-half to one drachm, according to size, every four hours, and stimulants should be applied to the sides.

SPASMODIC COUGH.

This is best treated by giving calomel, one grain; tartar emetic, one grain. In some cases a stimulating liniment must be applied to the throat, as spirits of camphor.

LX.

DISEASES OF THE EYE.

OPHTHALMIA—INFLAMMATION OF THE EYE.

The disease yields readily to treatment in the mild form. When it occurs as an epizootic in kennels it proves more stubborn.

Symptoms.—There is a redness of the conjunctiva, tenderness to light, and a secretion of tears. The eyeball is retracted in the socket. There is an extravasation of blood within the conjunctiva, which may increase as the disease advances. The cornea becomes opaque. If the disease is not arrested, ulceration may take place and the sight be destroyed by the bursting and discharge of its contents.

Causes.—It is caused in various ways, as by injuries to the eye, bad feeding, lodging, want of exercise, extremes of heat and cold, etc.

Treatment.—Give two drachms of epsom salts. The eye should be fomented several times a day with cold water in the summer and warm water in the winter. After the eye has been thoroughly fomented, a lotion composed of zinc sulphate, grains five; water, ounce one; laudanum, drachm one; belladonna tincture, drachm one, should be put into the eye with a sponge. Weak vinegar and water, with a small portion of laudanum, is said to be good.

CHRONIC OPHTHALMIA.

In this form the discharge from the eyes is not so great. The conjunctiva is not so red or congested. The inner side of the lid is ulcerated.

Treatment.—Fomentations should be kept up as in simple ophthalmia. The animal should receive two drachms of epsom salts internally. Zinc sulphate, twenty grains; tincture of belladonna, one ounce; laudanum, one ounce; water, four ounces, may be used as a wash to the eye.

Traumatic ophthalmia is produced by wounds, foreign substances in the eye, etc.

Treatment.—Remove the foreign body. Treatment is similar to simple ophthalmia.

ULCERATION OF THE CORNEA.

This is met with more frequently in the dog than in other animals. The ulcer may be touched with the nitrate of silver.

AMAUROSIS.

By this is meant a partial or complete paralysis of the optic nerve. If there is complete paralysis, total blindness ensues. The disease is characterized by a dilated state of the pupil. The coats and humors of the eyes are transparent. It is a disease very deceptive to the inexperienced observer.

The disease is caused principally by concussion, from blows upon the head, disease of bone, epileptic fits, or tumors.

The treatment of amaurosis is so unsatisfactory that it is a waste of time to attempt it.

SYMPATHETIC OPHTHALMIA.

This condition arises from other disease in some other part of the body or from derangement of the stomach, mange, etc.

Treatment.—Give a drachm of jalap, and apply zinc sulphate, grains five; opium tincture, drachm one; belladonna tincture, drachm one; water, ounce one. Apply to the eye.

Congenital blindness occurs sometimes throughout the whole litter of puppies, due to heredity. The puppies should be destroyed.

CATARACT.

Cataract consists of a partial or complete opacity of the crystalline lense, due to various causes. In the horse it is generally due to periodic ophthalmia. It may be caused by old age, hard work, and bad breeding. When seen in young dogs it is generally caused by blows and injuries to the head.

TREATMENT.—Treatment of this disease is very unsatisfactory, and usually terminates in opacity of the lense. Therefore, I advise no treatment.

EXTIRPATION OF THE EYE.

I have found a simple spoon to be the best instrument for removing the eye. The attachment of the muscles to the orbit may be easily disengaged by a firm pressure of the spoon. Another method of removing is by passing a curved needle through the eye. This will assist in making the excision with the scalpel. The hemorrhage from the operation is trifling. If the eye has been extirpated on account of a malignant disease, the actual cauter should be used on the parts.

ULCERATION OF THE EYELIDS.

This occurs in old or ill-fed animals. The lids become enlarged and tender. The lashes fall out and the edges present an angry, red appearance.

TREATMENT.—Tincture belladonna, one drachm; opium, a half ounce; zinc sulphate, forty grains; water, four ounces, should be used on the eye. Later it may be necessary to touch the parts with the nitrate of silver. If the lids are considerably swollen they may be scarified. Fomentations are useful. Warts on the lids of the eyes may be excised and the wound touched with the nitrate of silver.

PROTRUSION OF THE EYES.

This frequently occurs from fighting. If the ball is not injured and the eye is warm, showing that the circulation is not cut off, it may be put in place.

Treatment.—The eyeball and orbit should be wiped with a silk handkerchief, and immediately replaced within the socket. When handling the eye, the fingers should be dipped in warm water or olive oil. In replacing the eye, it must be done gently. A firm pressure must be brought to bear, and the pressure should be changed from one part to the other, in order to replace it in the socket. A little oil may be placed on the inside of the lids. If it is best to remove the eye, a needle with a thread may be passed through it; then draw it out as far as possible, and cut off close to the lids. The bleeding will soon cease and the lids close perfectly.

FISTULA LACHRYMALIS.

The lachrymal duct is a small canal leading from the internal angle of the eye to the nostrils, and is the passage through which the tears escape. This duct may become closed by inflammation of the mucous membrane lining the nasal chamber, by fungus growths, etc. The canal when thus obstructed forms a fistulous opening, just above the internal canthus.

Treatment.—An effort should be made to clean out the canal by a suitable syringe. A small silver slide should be placed in the canal to keep it open and to direct the tears through the natural channel. The dog must be confined so that he cannot scratch the eye.

WEAK EYES.

Some breeds of dogs have naturally weak eyes. The eye in such cases may be strengthened by the use of vinegar, one ounce; laudanum, one scruple; water, six ounces. Sulphate of zinc, one scruple; water, six ounces, is another good remedy. When a white film remains on the eye after acute inflammation has subsided, nitrate of silver, one scruple; water, six ounces, should be dropped into the eye.

LXI.

DISEASES OF THE EAR.

CANKER.

This disease affects principally the water dog, but no breed is exempt. It is frequently met with in the pointer and setter.

Internal canker, otorrhœa, is an inflammation of the lining membrane of the meatus auditorus externus, with a discharge of purulent matter, sometimes mixed with blood, which may occasionally coagulate, block up the tube and cause deafness. When the disease extends to the internal ear it constitutes otitis, which may end in death. The disease is local or constitutional. When local, it is caused by the lodgement of dirt, water, or foreign matter in the ear. The constitutional arises from improper and overfeeding, want of exercise, catarrhal affections, and the extension of skin diseases.

The earliest symptom of the approach of canker is frequent shaking of the head, or holding the head to one side. The dog will scratch the ear violently. Redness of the integument lining the annular cartilage may be observed, and this may be accompanied by an enlargement of the folds of the skin. If the case be neglected, the pain will rapidly increase, the ear becoming redder, and there will be a deposit of red or black matter in the hollow of the ear.

Treatment.—The ear should be thoroughly washed three times a day with warm water and soap. A scruple of the extract of lead to an ounce of water should be applied. The preparation should be applied warm, and may contain a little tincture of opium. A purgative should be administered in the first stages and the animal kept on a cooling diet for a few days. The liquid

should be poured into the ear, and the dog's head held firmly until it insinuates itself as deeply as possible in the passages of the ear. Zinc sulphate and alum are useful, and should be applied in the proportion of six grains of either to the ounce of water. A solution of the perchloride of iron is a very effectual remedy. Should the disease continue after this treatment, nitrate of silver in the proportion of five grains to the ounce of water should be employed. The animal should receive good food, and the following tonic should be used to improve his general health: Strychnia, grains two-fifths; essence of pancreatin and pepsin, of each two ounces. A teaspoonful to be given after meals. When it becomes very painful and acute, the animal howling with a pain, a seton should be inserted behind the ear. If the fever is very great, nitrate of potash, etc., may be used in twenty-grain doses.

EXTERNAL CANKER.

This is an abraded or wounded condition of the ear. It is caused by the dog shaking his ears, or from accidental injury. It is rarely found in other than long-eared dogs. It may first appear as a very small, trifling wound, but from constant flapping the wound grows larger and the ear commences to split. A netting should be worn over the ears to prevent the dog shaking them. He must not be allowed to go in the water. The remedies recommended for internal canker may be used in external canker.

If the ear be split to any depth, and if after removing the cap the wound separates, the edges must be pared and brought together with metallic sutures.

POLYPUS.

Polypi sometimes seen in the ear of the dog may be removed with small scissors and ligatures of wire or silk. When removed, the base of the tumor should be destroyed by the nitrate of silver; it may be necessary to repeat the application. Tumors are sometimes seen in the flap of the ear, and may extend from the base of the ear to the lip of the flap.

TREATMENT.—The astringent preparation recommended for canker should first be used. When, however, it becomes evident that the tumor will not heal, it must be opened throughout its whole extent. A poultice should be applied for several days. The parts may be dressed with chloride of lime, one drachm; water, six ounces.

LXII.

DISEASES OF THE NOSE AND MOUTH.

Ozæna, a fetid discharge from the nose, is a very troublesome and frequent affection of the dog. Slight fever is present, the parts are swollen, and there is a fetid discharge from the nose. If not attended to it will become chronic, and the animal will be rendered offensive and unsightly. Caries of the bones of the nose will ultimately take place. It is caused by inflammation of the mucous membrane of the nose, or may result from distemper or a polypus in the nose.

Treatment.—Give a drachm of jalap at the beginning. Weak astringents should be injected up the nose. Carbolic acid, one part to fifty or sixty of water, is good. Zinc sulphate, five grains to the ounce of water, is a good remedy. Alum, one scruple; water, one ounce; mix and inject.

THE TONGUE.

Inflammation of the tongue, met with in all animals, is a dangerous affection. The disease comes on suddenly, with fever, heat, swelling, and redness of the tongue, which protrudes from the mouth, exhibiting a dry, hot, inflammatory appearance. There is a desire to lap water, and great uneasiness is exhibited. It is caused by injuries to the tongue, stings of insects, and from taking poisonous substances in the mouth.

Treatment.—Astringents should be applied to the tongue, as solution of alum, strong vinegar, oak bark, etc., and a large blister should be placed under the throat. A purgative should be given as soon as possible.

THE LIPS.

The lips sometimes become sore and swollen, and the soreness has a tendency to spread over the cheek externally. Zinc sulphate, grains five; water, one ounce, will remove the trouble.

TEETH.

Little dogs, especially in cities, frequently suffer with decayed teeth and diseased gums. Sometimes there is a great accumulation of tartar around them. The loose teeth should be removed, and if there is a deposit of tartaric acid, it must be removed by a suitable brush; chlorinated lime, diluted with twenty times its bulk of water, should be applied to the gums. This will quickly remove the tartar and heal the ulcers.

Diseases of the larynx, pharynx, and trachea are similar to those affecting the same organs in the horse. For a full description, see Respiratory Diseases of Horses.

FOREIGN ARTICLE IN THE THROAT.

Bones frequently become lodged in the throat. If beyond reach, the better plan is to attempt to shove it downward into the stomach. A piece of sponge securely fastened to a piece of whalebone makes a good probang for the dog. If it cannot be dislodged, an incision should be made in the œsophagus and the bone extricated. This should not be done except as a last resort.

LXIII.

DISEASES OF THE FEET.

This frequently occurs in hunting dogs. The feet become tender, swollen, and hot; the toes become sore; the claws are diseased, and the balls painful.

Causes.—It is caused by running over frozen or stony ground and hunting over rough country. Over-feeding may produce it, the morbid process seeking an outlet at the foot.

Treatment.—The dog should be confined to his house. A drachm of jalap should be given. If pus forms in the balls of the feet, they must be lanced. Zinc sulphate, one ounce; lead acetate, one ounce; water, one pint, should be used freely on the feet.

PUSTULAR AFFECTIONS OF THE FEET.

This is sometimes seen affecting the toes, and occurs independently of mange and other skin diseases. It is caused by uncleanliness, bad housing, etc.

Treatment.—Wash frequently with castile soap and water. The parts should be dressed with the zinc and lead lotion.

WOUNDS OF THE FEET.

These frequently occur from stepping on sharp instruments, glass, thorns, nails, etc.

Treatment.—If the foot is cut deeply it should be thoroughly cleansed and brought together with several sutures and strips of adhesive plaster. When the foot is punctured, a careful search should be made for the foreign body, and its removal effected. A poultice should be applied. Wounds in the feet may be dressed with the zinc and lead lotion.

SPRAINS.

Sprains are very frequent in hunting dogs, and are characterized by lameness, heat, and swelling.

TREATMENT.—Hot fomentations, purgatives, and the use of the ammoniacal liniment—viz., equal parts of ammonia, turpentine, and linseed oil. Other stimulants may be used, as spirits of camphor and alcohol.

FRACTURE.

No other animal recovers so quickly from a fracture as does the dog. In little dogs, the simple plaster of Paris bandage is all that is necessary. The starch bandage does very well. Cayenne pepper should be sprinkled on the bandage before it becomes dry to prevent the dog gnawing it. The bones unite very quickly, and the bandage may be removed in two weeks.

CASTRATION.

Castration of dogs has been dealt with under the head of Castration of Horses.

LXIV.

PARTURITION.

Parturition generally takes place in the bitch from the sixty-second to the sixty-fourth day. A quarter to three-quarters of an hour is required for the production of each puppy.

Assistance is generally necessary in the production of the puppies, owing to the fact that if allowed to associate with dogs larger than themselves they sometimes pay for it with their lives. The bitch should be regularly exercised for some time previous to lying-in. The bowels should be kept in proper condition. When the time for lying-in has arrived and there is difficulty in producing the fetus, recourse should be had to the ergot of rye. It should be given every hour or half hour, according to circumstances.

A drachm should be given every half hour until the fetus is expelled, or until six or eight doses have been given. If ergot fail, recourse must be had to the hook or forceps. The manipulation must be gentle and continued. If the animal seems to be losing strength, a half drachm of ether and ten or fifteen drops of laudanum may be given. The patience of a bitch in labor is remarkable. Their distress is very affecting and their look imploring. Injections of warm water, to which a little soap has been added, into the uterus will assist in removing the fetus. When the puppies are dead their removal may be effected by patient and gentle manipulation. When violence has been used at the commencement, the patient will die. During labor the expulsion of fetus may be assisted by giving a warm bath and an ounce of castor oil.

LXV.

PARASITES INFECTING THE DOG.

ASCARIS MARGINATA.

This worm, a frequent source of sickness, is the most common in the dog. The male is three inches long, the female four to six inches.

Symptoms.—Irregularity of the bowels, voracious appetite, colic, loss of flesh. The worm sometimes finds its way into the trachea, and when such is the case the animal has a persistent cough. The parasite reaches the trachea through the œsophagus. They have been known to find their way into the nasal cavity and produce obstinate sneezing. There may be partial paralysis.

Treatment.—Santonin, in three to five grain doses, mixed with castor oil, may be given on an empty stomach every morning for three or four days. This treatment should be followed with a good purgative. Then give tonics—gentian, quassia, and sulphate of iron, each five grains.

ASCARIDE.

The ascarides are small, thread-like worms, generally not more than six or ten inches in length. They are white in color, the head obtuse, and the tail terminating in a transparent prolongation. They are principally found in the rectum; they seem to possess considerable agility, and the itching caused by them is intense. The dog often drags the fundament along the ground to relieve this itching. The worms roll themselves in a ball as large as a nut, and it is difficult to disentangle them. When in the stomach they are not removed by vomiting. Young dogs are subject to and are with great difficulty entirely freed from them.

The treatment of this worm is similar to the treatment of ascaries marginata.

TERES.

Another worm, the teres, occasionally infects dogs. It resembles the earth worm. Occasionally they crawl into the stomach and produce a great deal of inflammation.

TAPEWORM—TAENIA ECHINOCOCCUS.

This worm consists of a head and three segments. It is one-third of an inch in length. The last segment is the longest part of the body.

TAENIA COENURES.

This worm is from twelve to eighteen inches long.

TAENIA MARYMALO.

This is the large tapeworm of the dog. It measures from three to eight feet long, and consists of a head and four suckers. We find them all in the small intestines. The mugmato is found about the middle of the intestine. In regard to numbers, the first parasite is not common. You may find a thousand or perhaps only forty. In the second and third varieties you will find from one to twelve. All of them are found holding on to some part of the mucous membrane of the small intestines. They impregnate in the dog.

Symptoms.—A wasting away of the animals, voracious appetite.

Treatment.—First give the animal a purgative, and on the following morning give the worm medicine. Male shield fern or Felix mass and powdered areca nut should be given—powdered areca nut, two grains for each pound of the animal's weight; male shield fern, ten to twenty drops. Two hours afterward a tablespoonful of castor oil should be given. In twelve hours the worms will be passed. The fæces should be burnt. This treatment should be repeated every two weeks, and then every eight weeks, until a cure is effected.

LXVI.

POISONS AND THEIR ANTIDOTES.

ACIDS.

Acetic, citric, muriatic, and tartaric acids require alkalies as antidotes, such as carbonate of soda, potash, lime, and magnesia. As soon as the acids are neutralized, mucilaginous teas, such as flaxseed, gum arabic, or slippery elm, may be given. Sulphuric acid requires soap in solution, or magnesia, as an antidote. Nitric acid poison is counteracted by lime water, carbonate of lime, and magnesia in solution. For carbolic acid there is no special antidote. Oil, glycerine, milk, flour and water, white of eggs, magnesia, and flaxseed tea may be used. Prussic acid, laurel water, and oil of bitter almonds are the most deadly poisons. Cold should be applied to the head and ammonia inhaled. If prussic acid is taken internally in poisonous doses it will kill almost instantly. Copper and its compounds, blue vitrol, and verdegris may be counteracted by giving yellow prussiate of potash in solution. Albuminous substances should be given, such as milk. white of eggs, wheat flour in water or magnesia.

Arsenic and its compounds are the most common poisons. Paris green, the well-known potato-bug killer, frequently poisons cows. The cow will eat almost anything, and if allowed to get at a tub in which Paris green has been mixed she will lick it as though it were meal. Under the arsenical compounds we have white arsenic, yellow sulphate of arsenic, red sulphate of arsenic, king's yellow, and fly powder; arsenical paste, soap, Scheel's green, and Paris green. Their antidotes are oils, fats, lard, melted butter, and milk. In animals that vomit, the stomach should be evacuated by giving zinc sulphate or mustard. Mucilaginous drinks may be given as soon as the stomach is evacuated. Fine

powdered iron rust may be given every fifteen minutes. Lead and its compounds, lead acetate, white lead, red lead, and litharge poisoning may be counteracted by giving purgatives, anodines, and potassium iodide.

Mercury, corrosive sublimate, white precipitate and red precipitate, calomel, require albumen in some form. If the poison is not absorbed, follow with a mustard emetic in animals that can vomit. It should be remembered that the horse cannot vomit, neither can the ox and sheep very readily. Other animals vomit freely. The stomach pump may be used on those that cannot vomit.

Some oils, such as creosote, oil of tar, and oil of turpentine will destroy life. When an over-amount is taken it may be counteracted by giving mucilageous drinks, wheat flour mixed with water, eggs, milk, etc. The antidote for iodine is similar to the above.

Alcoholic poisoning may be treated by giving a powerful emetic and applying cold to the head and rubbing the extremities.

Alkalies, such as liquor of ammonia, water of ammonia, muriate of ammonia, may be neutralized by giving vinegar, lemon juice, citric and tartaric acid. Liquor of potassium, nitrate of potash, carbonate of potash, and salts of tar, seldom produce poisoning, but their effects may be reduced by giving mucilaginous drinks and any of the fixed oils.

Ergot, aconite, fox glove, black helebore, veratrum viride, and gelseminum should be treated by emetic or the stomach pump. Belladonna and stramonium may be counteracted by morphine, sassafras, iodine, and stimulants. Nux vomica and strichnine may be neutralized by giving large doses of camphor.

Henbane and opium may be treated, by sassafras for henbane and belladonna for opium. Cold should be applied to the head and the extremities should be rubbed.

GLOSSARY TO THE STOCK OWNER'S ADVISER.

Abate—To lessen, to diminish.
Abdomen—The belly; that part of the body which contains the stomach and intestines.
Abdominal—Belonging to the abdomen.
Abnormal—Unnatural.
Abortion—Expulsion of the fetus before it is capable of sustaining life.
Abscess—A collection of pus in any tissue or organ of the body.
Absorption—The act or process of absorbing or sucking in; the condition of being absorbed or sucked in.
Abrasion—A rubbing off, as a piece of skin.
Acetabulum—The bony cup which receives the head of the thigh bone.
Acme—The top or highest point.
Acrid—Pungent, irritating.
Acute—Sharp, severe; an acute disease is severe and comes speedily to a crisis.
Adipose—Fatty.
Adhesion—The action of sticking; union of surfaces.
Adventitious—Accidental; acquired, as diseases.
Affection—Disease; malady.
Albumen—In urine a chemical composition resembling the white of an egg.
Albuminoid—Of the nature of albumen.
Aliment—Any kind of food.
Alimentary Canal—The canal extending from the mouth to anus through which food passes, and the useless parts are ejected.
Alkali—A substance which neutralizes acids, as soda, potash, etc.
Alterative—A medicine that gradually induces a change.
Alveolar Processes—That part of jaw which contains the sockets of the teeth.
Amaurosis—A loss of sight from loss of power of the optic nerve.
Amenorrhœa—Retention or suppression of the menses.
Amnion—A membrane enveloping the fetus and the liquid.
Amputation—The act of removing a limb.
Amyloids—Foods composed of carbon and hydrogen, as sugar and starch.
Anæmia—A morbid condition in which the blood is deficient in quality or in quantity.
Anatomy—The science of the structure of the body.
Anæsthetic—That which produces insensibility to pain.

Angina Pectoris—Neuralgia of the heart; called also *breast pang.*
Animalcule—An animal invisible to the naked eye.
Anodyne—Medicine which relieves pain.
Anomaly—Irregularity; deviation from the common rule.
Anthelmintic—Medicine which destroys or expels worms from the stomach and intestines.
Antidote—A remedy to counteract the effects of poison.
Antiseptic—A substance which prevents putrefaction.
Antispasmodic—A medicine which relieves spasms.
Anus—The circular opening at the end of the bowel.
Aorta—The great artery which carries the blood from the heart to all parts of the body except the lungs.
Aperient—A medicine which moves the bowels gently.
Aqueous—Watery.
Articulate—To join together.
Apoplexy—Rush of blood to an organ.
Arachnoid—A thin membrane covering the brain.
Areolar Tissue—A network of delicate fibres spread over the body.
Artery—One of the vessels or tubes which carry blood from the heart.
Astringent—A medicine which contracts the flesh.
Attenuate—To make thin.
Atrophy—A wasting away.
Auscultation—Diagnosing disease by listening.
Auricle—The external part of the ear; an earshaped appendage or part.

Benign—Mild, kind, gentle.
Bile—A bitter yellow or greenish fluid secreted by the liver.
Biliary—Belonging to or containing bile.
Bronchial—Belonging to the divisions of the windpipe.
Bisect—To divide into two equal parts.
Biology—The science of life.
Bistoury—A small cutting knife.
Blood Serum—The yellow fluid which is left after the coagulation of blood.
Bolus—A large pill.

Calcareous—Containing lime.
Calcification—The process of change into a calcareous substance; converting into chalk.
Calculus—Stones formed by a deposit of solid matter.
Callus—A hard deposit.
Capillaries—Very small blood vessels connecting the arteries and veins.
Capsule—A membranous bag enclosing an organ.
Caries—Ulceration of bone.
Cartilage—Gristle.
Carotids—The great arteries of the side of the neck.

Carminative—A substance which allays pain in the stomach and intestines by expelling gas.
Cardiac—Pertaining to the heart.
Carbonic Acid—A heavy poisonous gas.
Casein—The part of milk which contains nitrogen.
Catarrh—Chronic inflammation of a mucous membrane.
Castrate—To deprive of the ovaries or testicles.
Cathartic—A purgative.
Catheter—A hollow tube used in drawing off the urine.
Caustic—A substance which burns or destroys tissue.
Cauterization—Searing with a hot iron.
Cephalic—Pertaining to the head.
Cerebellum—Little brain.
Cerebrum—The upper or large brain.
Cervix—The neck of the womb.
Chronic—Of long continuance.
Cholagogues—An agent which promotes discharge of bile.
Chyle—Food digested and ready for absorption.
Chyme—Food after being subjected to the action of the gastric juices.
Cicatrize—To heal or induce the formation of a scar.
Cilia—Small hairs.
Clyster—A liquid injection into the intestines.
Coagulate—To thicken, to harden.
Coition—Sexual intercourse.
Coffin-Bone—The lower bone of the leg encased in the hoof.
Colic—A painful disorder of the intestine.
Colon—Part of the large intestines.
Coma—A condition of heavy, unconscious sleep.
Conception—The beginning of pregnancy; impregnation of the ovum.
Congenital—Born with, belonging to from birth.
Congestion—An abnormal amount of blood in a part.
Conjunctiva—The membrane which covers the external surface of the ball of the eye.
Contagion—The transmission of a disease by direct or indirect contact.
Convoluted—Curved or rolled together.
Copulation—Sexual intercourse.
Corium—A layer of skin.
Cornea—A transparent covering of the front of the eye.
Contusion—A bruise.
Cranial—Pertaining to the skull.
Crucial—Like a cross.
Crural—Belonging to the leg.
Crustaceous—Having a crustlike shell.
Cul-de-sac—A passage closed at one end.
Cutaneous—Pertaining to the skin.
Cuticle—The outer or scarf skin.

Cyst—A small bladder or bag.
Cystitis—Inflammation of the bladder.

Debris—Broken or detached fragments.
Decoction—A fluid impregnated with any substance by boiling.
Defecation—A voiding of excrement from the body.
Deglutition—The act of swallowing.
Dejection—Matter voided from the bowels.
Degenerate—To grow worse or inferior.
Decarbonize—To free from carbon.
Deleterious—Destructive, poisonous.
Depletion—The act of emptying.
Dentition—Cutting of the teeth in infancy.
Deodorizer—A substance that destroys a bad smell.
Dermal—Belonging to the skin.
Depravation—Corruption.
Detergent—Cleansing.
Dermatologist—One who makes diseases of the skin a specialty.
Desiccate—To dry up.
Desquamation—Scaling off of the skin.
Diabetes—A disease which is attended with an inordinate flow of urine.
Diagnosis—The act of distinguishing one disease from another.
Diaphoretic—A medicine which increases perspiration.
Diaphragm—A muscular partition which divides the cavity of the chest from that of the abdomen.
Diathesis—Peculiarity of constitution.
Disinfect—To free from infectious matter.
Dilatation—Expansion; enlargement.
Diluent—A fluid which thins the blood, or holds medicines in solution.
Diuretic—A medicine which increases the flow of urine.
Douche—Dashes of water.
Drastic—A medicine which moves the bowels harshly.
Dropsy—An unnatural accumulation of fluid in the body.
Dorsal—Pertaining to the back.
Duct—A tube or vessel for conveying fluid.
Duodenum—The first portion of the intestine.
Dura Mater—A thick fibrous membrane lining the cavity of the skull.
Dyspnœa—Difficulty of breathing.

Ecchymoma—An effusion of blood into the cellular tissue under the skin.
Ecchymosis—A black or yellow spot produced by effused blood.
Ecraseur—Instrument for castration.
Eczematous—Of the nature of eczema.
Effluvium—An unpleasant odor or exhalation from decaying or putrefying matter.
Effusion—The pouring out of blood or other fluid from its proper vessels into the cellular tissue or into a cavity.

Elasticity—That property of matter by which a body tends to resume its original form after the removal of external pressure or altering force.

Eliminate—Discharge, expel.

Emaciation—Excessive leanness.

Embryo—The germ of an animal at the beginning of its development in the womb.

Emetic—A medicine which produces vomiting.

Emollient—Softening or relaxing.

Endocarditis—Inflammation of the lining membrane of the heart.

Endocardium—The lining membrane of the heart.

Enema—A medicine injected into the rectum.

Enteric—Intestinal.

Enteritis—Inflammation of the intestines.

Epidemic—A disease which attacks a number of animals at the same time.

Epiglottis—A cap over the windpipe, allowing the admission of air, but preventing the introduction of foreign bodies.

Epithelium—The thin covering upon the lips, nipple, mucous and serous membranes, the lining of the blood vessels and other canals.

Eruption—A breaking forth; a rash on the skin.

Esophagus—The tube which conveys food to the stomach.

Evacuant—Cathartic.

Excoriate—To remove the skin in part; to rub and gall or break the skin off; to abrade.

Excrement—Refuse matter.

Excrescence—An unnatural growth.

Excretion—The separation of fluids from the body by means of glands.

Exhalation—A breathing out, as of the air in the lungs.

Exostosis—An unnatural growth or projection of bone.

Expectorant—A medicine which promotes discharge from the lungs or throat.

Expiration—The act of breathing out or forcing air from the lungs.

Extraneous—Foreign.

Extravasate—To force or let out from the proper vessels or arteries, as blood.

Exudation—A discharge, as of sweat, through the pores.

Exude—To sweat; to discharge through pores.

Facial—Pertaining to the face.

Fæces—Excrement or refuse matter.

Fallopian Tube—The canals through which the ovum passes from the ovary to the womb.

Farcy—Acute glanders.

Fascia—A layer of connective tissue covering and investing all muscles.

Feculent—Foul or turbid from dregs or sediment.

Febrifuge—A medicine which reduces fever.
Febrile—Pertaining to fever.
Fecundation—The ovum uniting with the male germ.
Femur—The thigh-bone.
Fermented—Changed by a process of decomposition.
Fetid—Having an offensive smell.
Fetus or Fœtus—The young unborn animal.
Fibrin—An organic substance found in the blood, and composing a great part of the tissues of the body.
Fibrous Tissue—Connective tissue, composed chiefly of white inelastic or yellow elastic fibres.
Fibula—The small bone attached to the outer side of the tibia.
Fistula—A permanent abnormal opening into the soft parts, with a constant discharge.
Fistulous—Hollow like a pipe.
Flatulency—The state of being flatulent.
Flatulent—Generating wind in the stomach and intestines.
Flexible—Capable of being bent.
Flexor—A bender.
Fœtus—An unborn animal.
Follicles—Small depressions in the skin.
Fomentations—Local applications of cloths wrung out of hot water.
Fumigate—To apply smoke or vapor.
Fundus—The bottom or base of any hollow organ.
Fungous—Resembing mushrooms, spongy.

Galvanism—Current electricity.
Gangrene—Death of a portion of the body.
Ganglion—Any special nerve center or center of nervous action.
Gastric—Pertaining to the stomach.
Gelatinous—Jellylike.
Generation—The process, act or function of begetting; reproduction.
Genitals—The sexual organs.
Glans—Head of penis.
Granules—Small grains.
Glottis—The mouth of the windpipe.
Groin—The oblique depression between the abdomen and thigh.

Habitat—The usual abode or locality of an animal.
Hair-Bulb—The enlargement at the root of a hair.
Hæmal—Relating to blood.
Hæmatein—The coloring matter of the blood.
Hemorrhage—Discharge of blood from a ruptured blood vessel.
Haunch—The hip; the upper part of the thigh.
Hectic—Constitutional.
Hemiplegia—Paralysis affecting only one side of the body.

Hemorrhoidal Veins—The veins about the rectum which enlarge and form piles.
Hepatic—Belonging to the liver.
Hepatize—To turn into a substance resembling liver.
Hereditary—Transmitted from parent to offspring.
Hernia—The protrusion of an organ, in whole or in part, through some opening in the walls of its natural cavity.
Humerus—The upper bone of the foreleg.
Hygiene—That department of science which treats of the preservation of health.
Hymen—The fold of mucous membrane at the vaginal entrance.
Hyperæmia—A superabundance or congestion of blood in an organ or part of the body.
Hypertrophy—Excessive development; enlargement; thickening.

Idiopathy—A primary disease not depending on any other.
Ileum—A portion of the small intestine.
Incision—The act of cutting.
Infection—The communication of disease germs by indirect means.
Imperforate—Without a natural opening.
Impregnation—The fusion of the female germ-cell with the male germ-cell.
Indigenous—Native.
Indolent—Painless; a term applied to tumors.
Induration—The act of hardening.
Infiltration—The passage of fluid into the cellular tissue.
Ingest—To take in; applied to food.
Inguinal Canal—A passage through the abdominal wall in the region of the groin, through which the spermatic cord passes.
Inoculate—To communicate a disease by inserting infectious matter in the flesh.
Inorganic—Without the organs necessary for life, as a mineral.
Insalivation—The mixing of the food with saliva and other secretions of the mouth in eating.
Insemination—The emission of sperm in coition.
Inspiration—The drawing in of the breath.
Integument—The skin.
Interstice—A small space between the particles of a body.
Intercostal—Between the ribs.
Intermittent—Coming and going at intervals.
Intussusception—The slipping of the upper part of the small intestine into the lower.
Iris—A curtain which gives the eye its color.

Jejunum—The middle division of the small intestine, or that portion between the duodenum and the ilium.

Lachrymal—Pertaining to tears.
Lactation—The act of giving suck.
Lacteals—The vessels which convey milk.
Lamella—A thin plate or scale.
Laminal—Having the form of a thin plate.
Larynx—The enlarged upper portion of the windpipe extending into the throat.
Laryngitis—Inflammation of the larynx.
Laxative—A mild purgative.
Lesion—Any hurt or injury.
Ligament—A fibrous structure uniting bones.
Ligature—A cord or catgut to be tied around a blood vessel to arrest hemorrhage.
Lobe—A round, projecting part of an organ, as of the lungs and liver.
Loin—That portion of the body between the hip-bone and ribs.
Lymph—A transparent fluid, resembling blood, found in the lymphatic vessels.

Malady—Disease.
Malar—Pertaining to the cheek-bone.
Malformation—Irregular in structure.
Malignant—Applied to diseases which threaten life.
Mammalia—Animals that suckle their young.
Manipulation—Examination by the hand.
Massage—Kneeding, rubbing.
Meatus—Canal or passage.
Mediastinum—The partition formed by the meeting of the pleura, dividing the chest into two lateral parts.
Membrane—A thin sheet-like structure, usually fibrous, covering or lining some part or organ.
Meninges—Membranes covering the brain and spinal cord.
Menses—Monthly flow.
Menstruation—The discharge of bloody matter from the womb.
Mesentery—The fold or membrane which attaches the intestines to the spine.
Melastasis—A transference of disease from one place to another.
Molars—The grinding teeth.
Morbid—Diseased.
Molecule—The smallest portion of matter which can exist alone.
Mucus—A mucilaginous fluid found on the surface of certain membranes which keeps them soft and pliable.
Muscle—An organ which by its contraction produces motion.
Myalgia—Muscular rheumatism.

Nasal—Belonging to the nose.
Nausea—Any sickness of the stomach, with inclination to vomit.

Narcotic—A medicine which stupefies.
Necrosis—Mortification or death of bone.
Nitrogen—One of the gases in the atmosphere.
Noxious—Injurious.
Nymphomania—Extreme desire for sexual intercourse in the female.

Obesity—Excessive fatness.
Obstetrical—Pertaining to midwifery.
Ocular—Pertaining to the eyes.
Omentum—A fold of the peritoneum.
Optic—Pertaining to sight.
Osseous—Formed of or resembling bone.
Ossify—To form bone; to become bone.
Os Uteri—Mouth of womb.
Ovary—The female organ in which the ovum is formed.
Oxygen—A vital gas in the atmospheric air.

Pabulum—Food.
Palliative—A remedy which relieves, but does not cure.
Palate—The roof of the mouth.
Papillæ—Small nipple-shaped prominences found on tongue and skin.
Pancreas—The sweetbread, a gland connected with the intestine.
Parasite—An animal which lives in, or on, the body of some other animal.
Parenchyma—The soft cellular substance of the tissues of plants and animals.
Paroxysm—A periodical attack.
Parturition—The act of bringing forth young.
Patella—The knee-pan.
Pathology—The science which treats of diseases, their nature, causes, etc.
Pedicle—The narrow part of a tumor.
Penis—The male organ of generation.
Pectoral—Of or pertaining to the breast.
Peptic—Promoting digestion.
Pericardium—The double bag-like fold of serous membrane which encloses the heart.
Perichondrium—The membrane covering the cartilages.
Pericranium—The membrane lining the bones of the skull externally.
Periosteum—The fibrous membrane which covers bone.
Peritoneum—The serous membrane which lines the cavity of the abdomen.
Permeate—To pass through without rupture.
Pharynx—The muscular tube at the back part of the mouth which leads to the gullet.
Phlegmon—An inflammatory exudation in the connective tissue.
Phlegmonous—Relating to or of the nature of a phlegmon.

Phthisis—Consumption.
Physiology—The science which treats of the phenomena and functions of animal life.
Placenta—The vascular appendage which connects the fetus with the parent.
Plasma—The colorless fluid of the blood.
Plethoric—Having a full habit of body, full of blood.
Pleura—The serous membrane which lines the interior of the chest and covers the lungs.
Plexus—A net work of vessels, nerves or fibers.
Polypus—A tumor which grows from mucous membranes.
Portal Vessels—The cluster of veins that join and enter the liver.
Process—A prominence or projecting part.
Procreation—Generation and production of offspring.
Probang—A leather instrument for unchoking animals.
Probe—An instrument for examining wounds.
Prolapsus Uteri—A falling of the womb.
Prolapsus Recti—A falling of the rectum.
Prognosis—Opinion of the future course of a disease.
Prophylactic—Preventive.
Proteids—Foods composed of carbon, hydrogen, oxygen and nitrogen—as the white of an egg.
Protozoon—A primary division of the animal kingdom.
Pruritus—Itching.
Pruritus Vulva—A nervous disease attended with excessive itching of the external genital parts of the female.
Ptyalin—A ferment contained in the saliva of man and of most animals.
Puberty—The age at which the subject is capable of procreation.
Pulmonary—Relating to the lungs.
Pulsate—To beat or throb.
Pupil—The circular opening in the colored curtain within the eye.
Purgative—A medicine which causes evacuations of the bowels.
Pus—Yellowish-white matter produced by the process of suppuration.
Pylorus—That portion of the stomach through which the food passes to the intestines.

Quiescent—Being at rest.
Quickening—The time when the motion of the fetus within the womb is first perceptible.

Rabies—The disease known as hydrophobia.
Rales—Noise produced by air passing through mucus in the lungs.
Ramify—To divide into branches.
Raphe—A term applied to parts that look as if sewed together.
Receptacle—That which receives or contains.
Rectal—Pertaining to the rectum.

Recumbent—Reclining.
Regurgitation—The act by which blood is forced backward in an unnatural manner.
Remittent—Ceasing for a time.
Reproduction—The production of living bodies similar to the parents.
Resolution—The disappearance of inflammation without suppuration.
Respiration—Breathing.
Retina—That part of the eye upon which the image is formed in the act of vision.
Retrocession—Change of an eruption from the surface to the inner parts.
Rickets—A disease of the bones.

Saccharine—Like or containing sugar.
Sacral—Of or pertaining to the sacrum.
Saline—Salty.
Saliva—The secretion of the glands of the mouth.
Sanative—Curative.
Scale—One of the thin, flat, horny membranous or bony outgrowths of the skin of various vertebrates.
Scapula—Shoulder blade.
Sciatic Nerve—The great nerve of the thigh.
Sclerotic—Hard; applied especially to the outer coat of the eyeball
Scrotum—The bag which contains the testicles.
Scurvy—A disease due to impaired nutrition.
Secrete—To separate from the blood.
Sebaceous Glands—The oil tubes of the skin.
Sensorium—The seat of sensation.
Sedative—A medicine which allays irritation and irritability.
Septic—Having power to promote putrefaction.
Septicæmia—Blood poisoning, usually by absorption.
Sequel—That which follows.
Serum—(See Blood Serum.)
Shank—The part of the leg from the knee to the foot.
Slough—To fall off.
Spinal—Belonging to the spine.
Splint—Osseous tumor on the splint-bone of a horse.
Sporadic—Separate.
Sternum—Breastbone.
Strangulated—Choked; having the circulation stopped.
Styptic—An astringent, having the property of arresting bleeding.
Sudorific—Causing sweat.
Suppuration—The process of generating pus.
Synovia—A fluid resembling the white of an egg.

Tapping—Drawing off collected fluid.
Tegument—The covering of the body.

Tendon—A tough cord, bundle, or band of fibrous connective tissue uniting a muscle with some other part.
Tenuity—Thinness.
Tergal—Of or pertaining to the back.
Testicles—The glands which contain the seminal fluid.
Therapeutic—Pertaining to the art of healing.
Thorax—Chest.
Tibia—The inner of the two bones of the leg or hind limb above the hock.
Tonsil—An oblong gland situated on each side of the fauces.
Tortion—The act of twisting.
Tourniquet—An instrument to arrest bleeding.
Trachea—The windpipe.
Translucent—Partially transparent.
Transudation—Passage of liquid through the tissues of the body.
Traumatic—Relating to a wound or injury.
Tractile—Capable of being drawn out.
Trephining—To perforate the skull with a trepan, so as to remove a piece of bone.
Triturate—To pulverize.
Tumer—A rounded projection of bone.
Tumor—A morbid swelling or enlargement on any part of the body.
Typanum—Ear drum.

Ulna—The elbow of the foreleg.
Umbilicus—The navel.
Urinary—Pertaining to the urine.
Uræmic—Of or pertaining to the accumulation in the blood of the principles of the urine.
Urea—A constituent of the urine.
Ureter—The canal leading from the kidneys to the bladder.
Urethra—The canal leading from the bladder outward.

Vagina—The canal between the vulva and the womb.
Varicose—Irregularly swollen or enlarged.
Vascular—Consisting of or containing vessels.
Ventral—Pertaining to the belly.
Veins—The vessels which return the blood to the heart.
Ventricles—The posterior chambers of the heart.
Vermifuge—A medicine which destroys or expels worms.
Vertebræ—The bones of the spinal column.
Vertigo—Dizziness.
Vesicles—Small bladders or sacs.
Villi—Minute thread-like projections.

Virus—Contagicus or poisonous matter.
Virulent—Very poisonous.
Viscera—The organs contained in the cavities of the body.
Viscus—Any internal organ.
Viscid—Gluey, sticky.
Vitreous Humor—The fluid in the eye behind the lense.
Vulnerary—Useful in healing wounds.
Vulva—The external organs of generation in the female.

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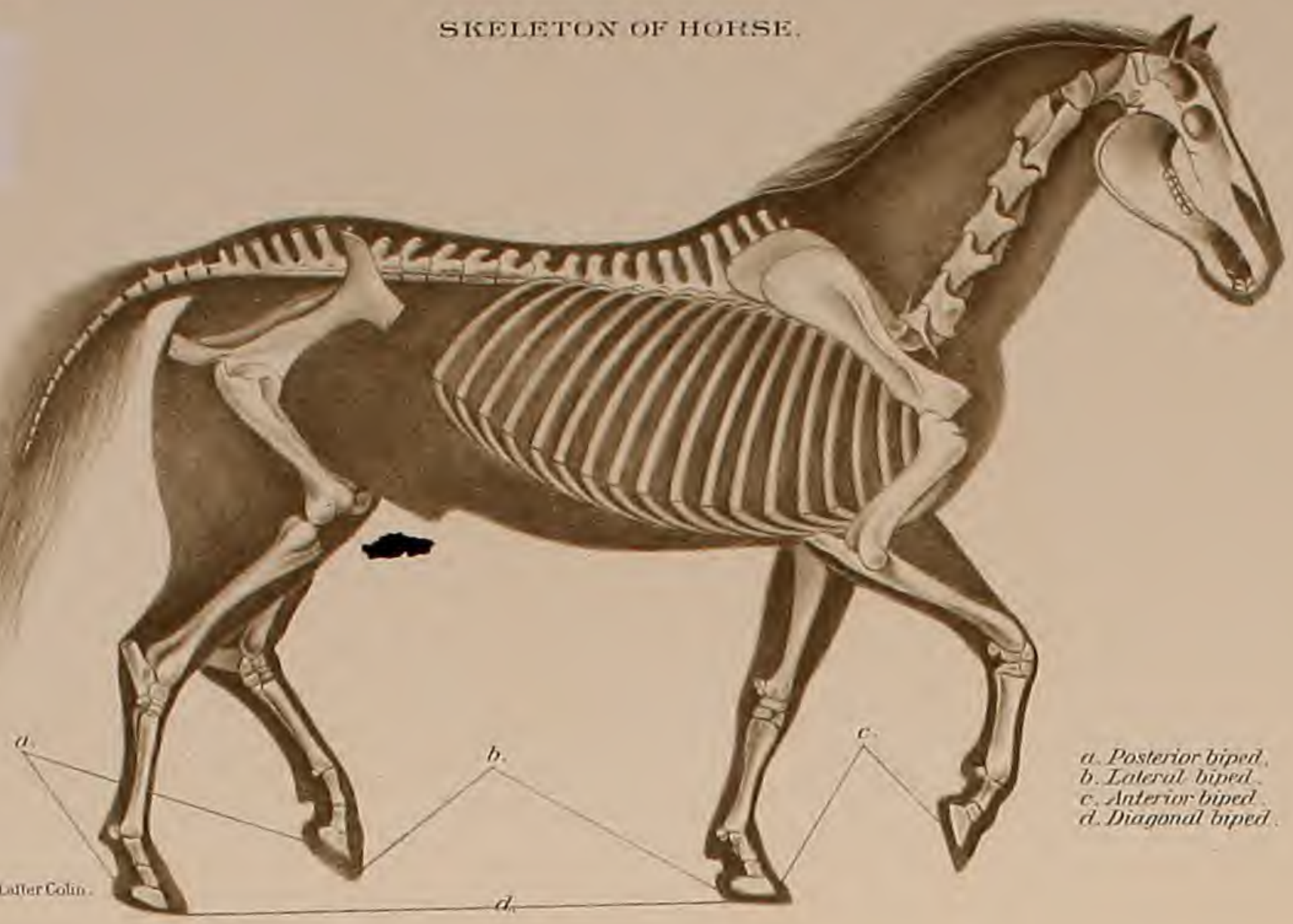
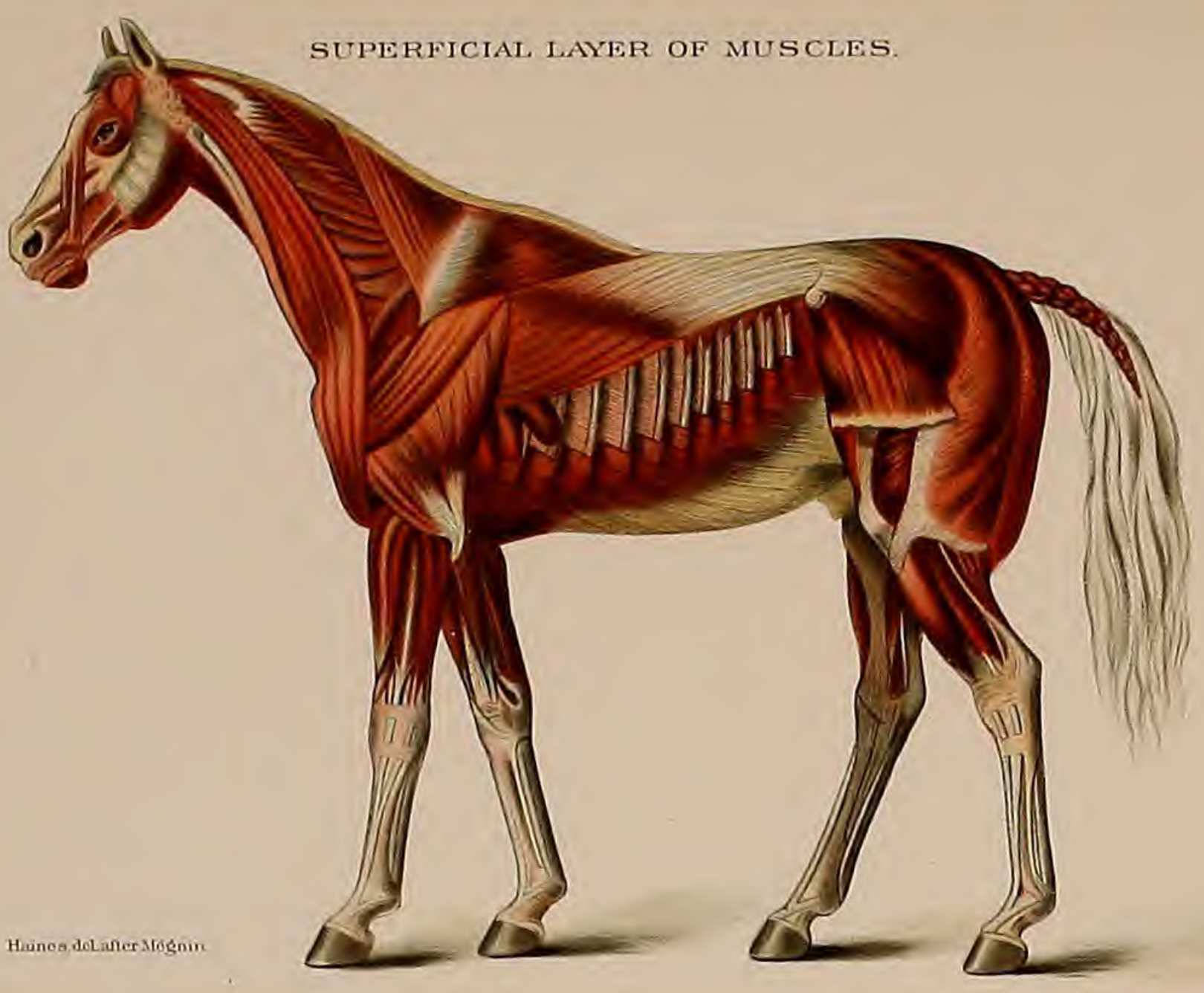
SKELETON OF HORSE.



a. Posterior biped.
b. Lateral biped.
c. Anterior biped.
d. Diagonal biped.

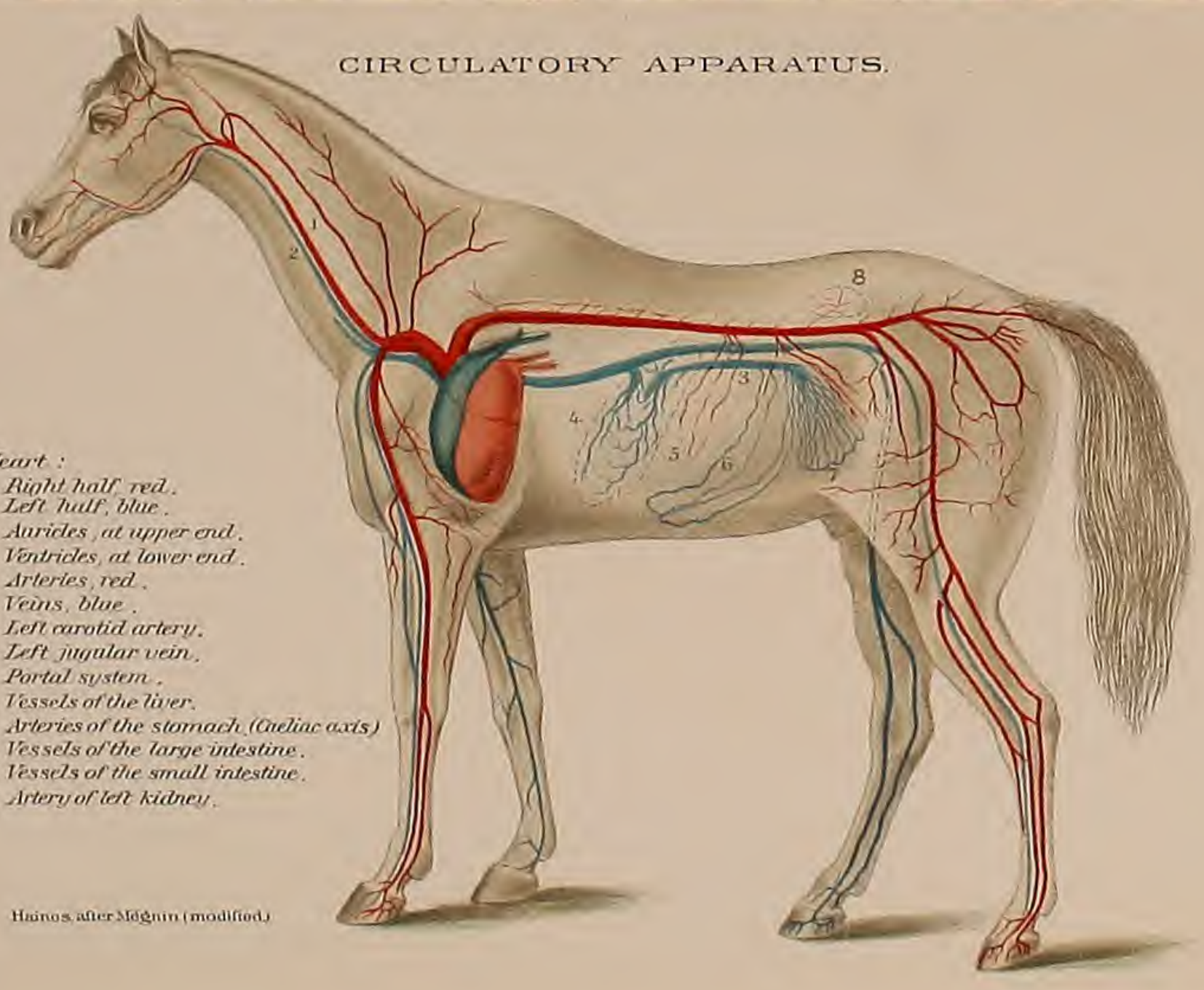
Haines, de Lafler Colin.

SUPERFICIAL LAYER OF MUSCLES.



Haines de Lafler Mégnin.

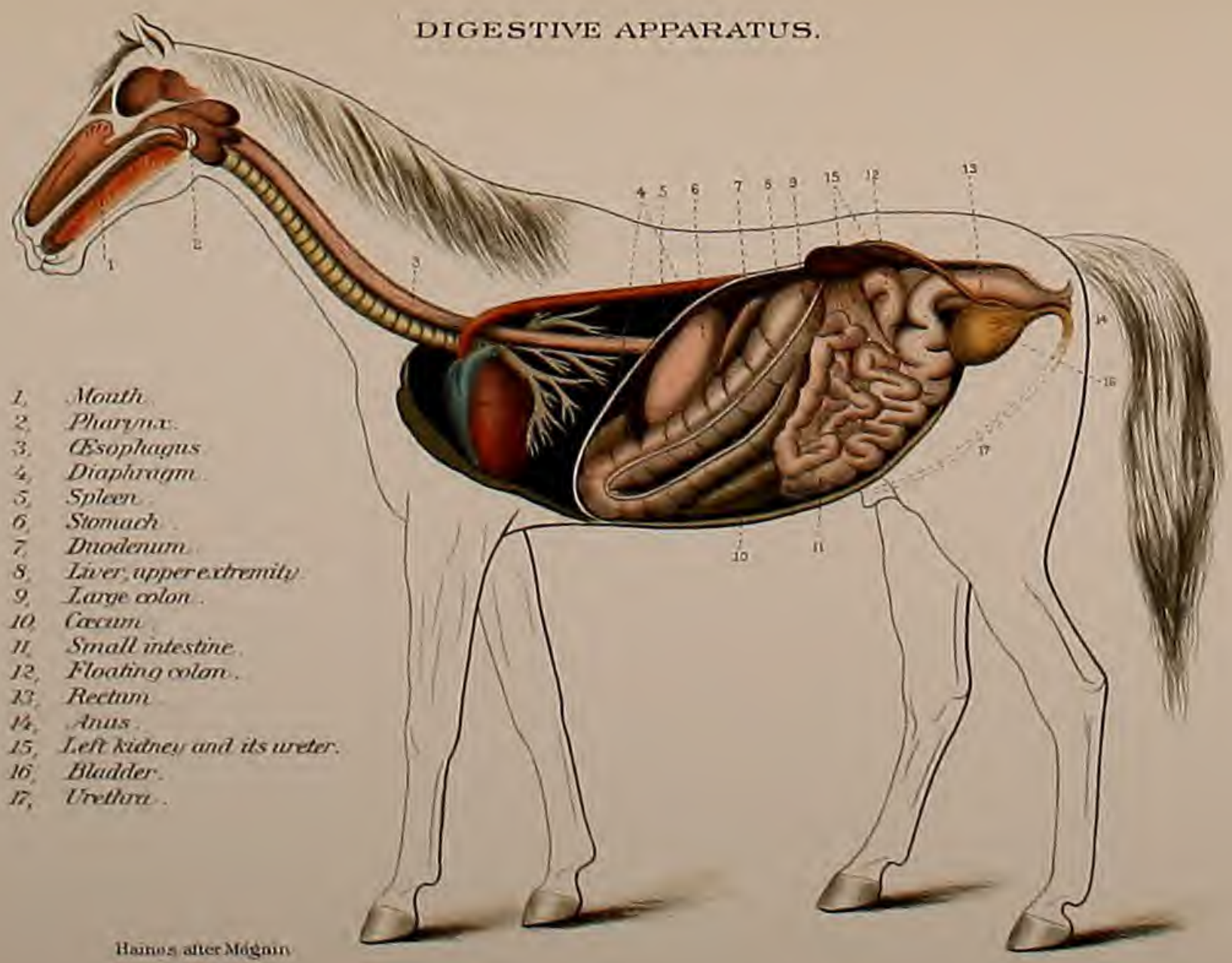
CIRCULATORY APPARATUS.



Heart :
Right half, red.
Left half, blue.
Auricles, at upper end.
Ventricles, at lower end.
Arteries, red.
Veins, blue.
1, Left carotid artery.
2, Left jugular vein.
3, Portal system.
4, Vessels of the liver.
5, Arteries of the stomach (Cœliac axis)
6, Vessels of the large intestine.
7, Vessels of the small intestine.
8, Artery of left kidney.

Haines after Mégnin (modified)

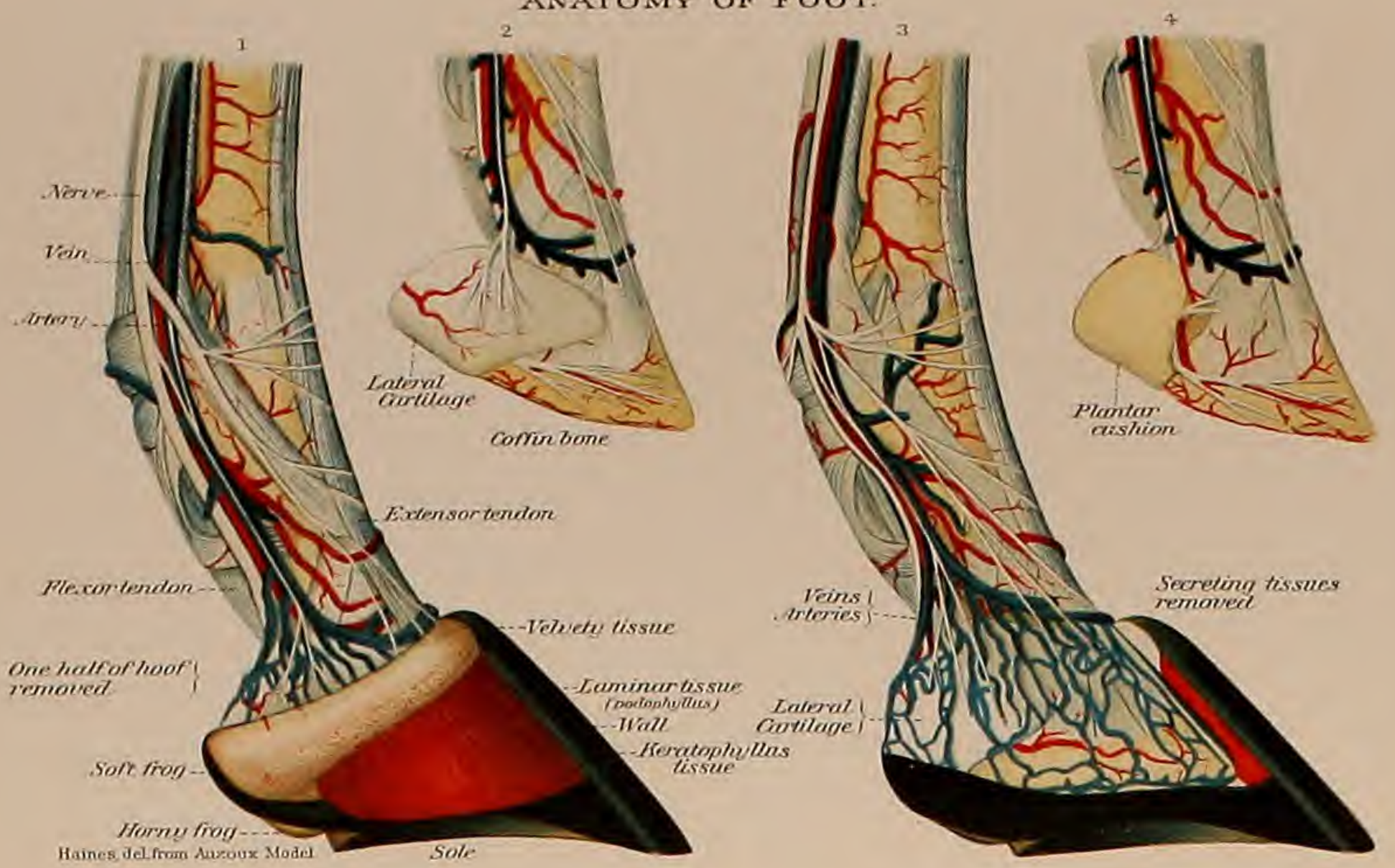
DIGESTIVE APPARATUS.



1, Mouth.
2, Pharynx.
3, Œsophagus.
4, Diaphragm.
5, Spleen.
6, Stomach.
7, Duodenum.
8, Liver, upper extremity.
9, Large colon.
10, Cæcum.
11, Small intestine.
12, Floating colon.
13, Rectum.
14, Anus.
15, Left kidney and its ureter.
16, Bladder.
17, Urethra.

Haines after Mégnin.

ANATOMY OF FOOT.



Haines del from Auzoux Model

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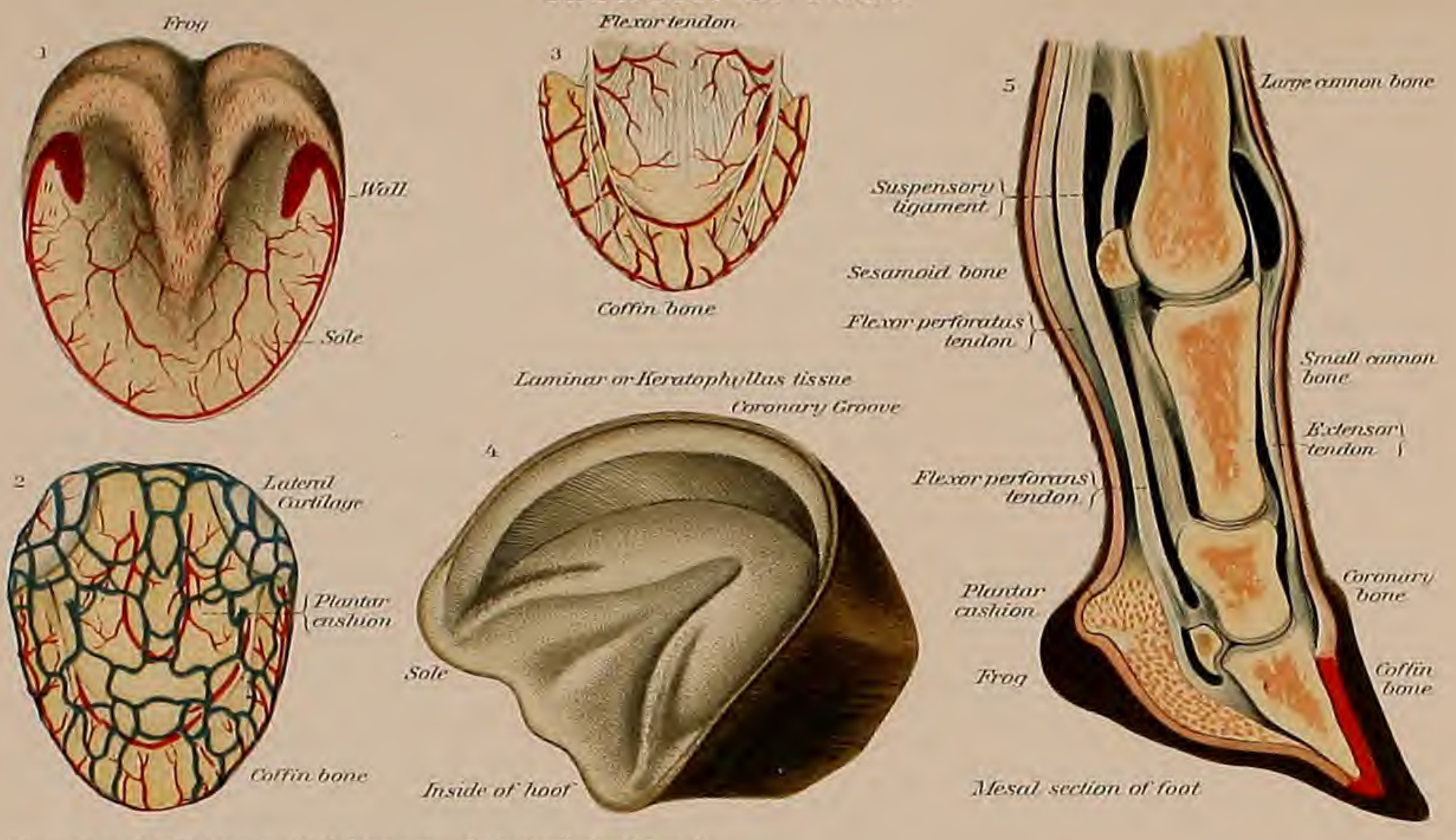
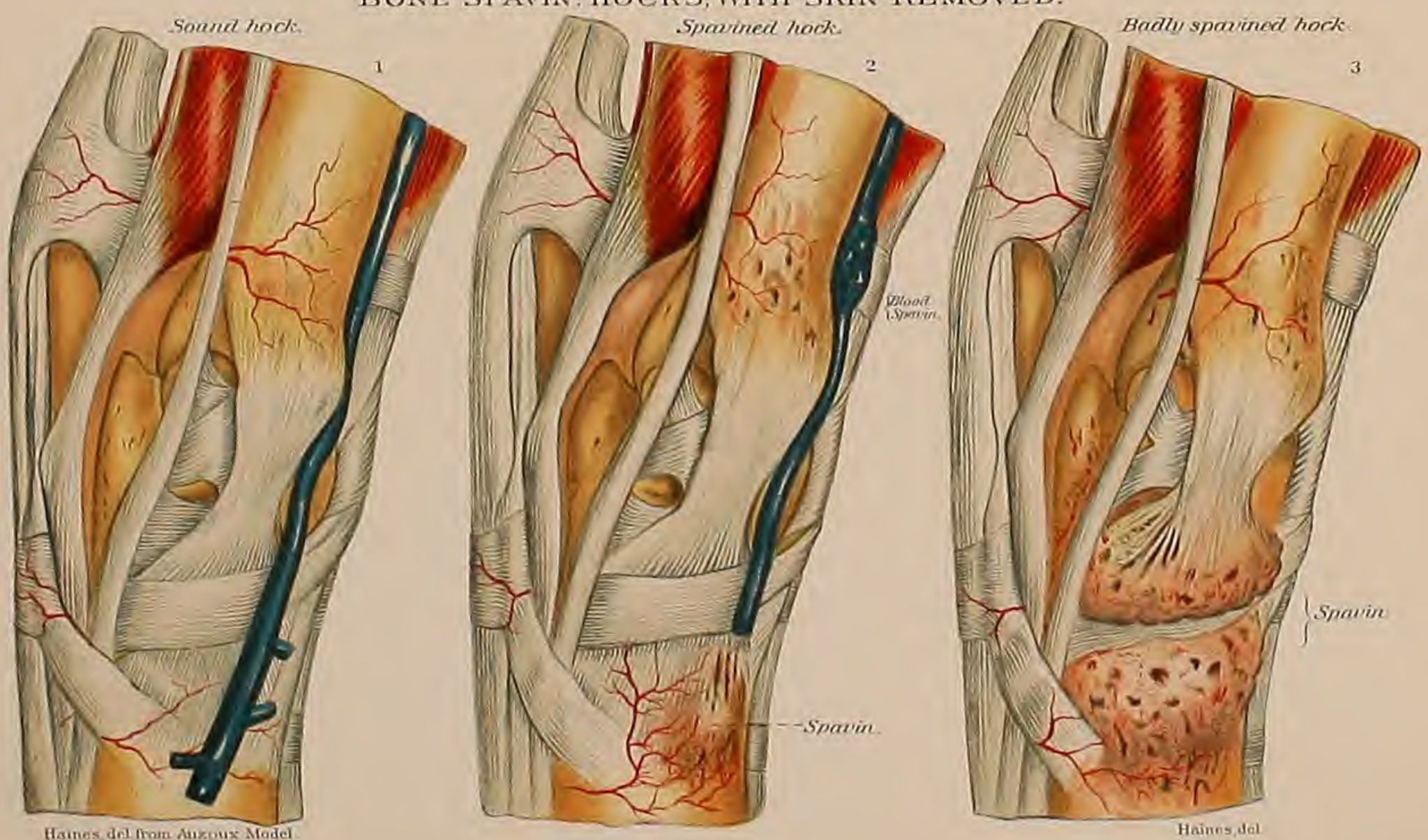


Haines, del. Nos. 1, 2 and 3, from model. No. 4, from nature. No. 5, after Hering (Colored).

BONE SPAVIN. HOCKS, WITH SKIN REMOVED.



Haines, del from Auzoux Model

Haines, del.

RING-BONE.

Haines, del from Auzoux Model.

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